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BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

Vol. XLIV 1912 No. 1

BRITISH EAST AFRICA PROTECTORATE

BY

ALEXANDER DAVIS
Editor of *The Leader*, Nairobi

The East Africa and Uganda Protectorates occupy the large area known as British East Africa. The first named Protectorate covers a part of Africa which, twenty to thirty years ago, was considered the typical habitat of savage tribes, many of them warlike and dangerous of approach. It was one of the few remaining channels of the interior slave trade, and the home of innumerable wild animals. Its geography had not long been ascertained. The three huge masses of mountains standing unique and imposing with their roots in the tropics and their summits in eternal snow,—Mounts Kilimanjaro, Kenia and Elgon,—were marvellous features; and the great Rift Valley, with its massive escarpments, had been traversed though not explored.

It is now only fifteen years since the first sod of the Uganda Railway was turned. The enterprise was projected, in the first instance, as a semi-philanthropic and semi-political undertaking. The British Government decided to construct it in order to facilitate the stoppage of the slave traffic and to gain better access to its sphere of operations in Uganda and Central Africa. Since the railway was built the whole aspect of things has altered. It is now known that these wild tracts make a wonderful, fruitful country, that the prevailing altitude is such as to modify the temperature and that, on the equator in Africa, is a great region that can scarcely be distinguished in climate from Southern Europe. The warlike tribes are now discovered to be comparatively peaceful and easy to govern, the most warlike being the least numerous. The fauna roaming over the great highlands are now found to exceed in number and variety, even the stories told of them by travelers.

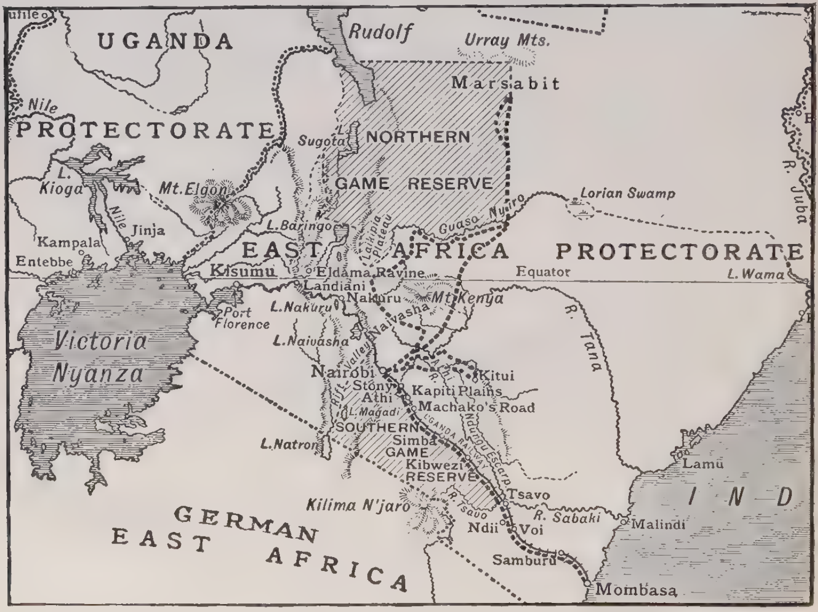
While many unexpected advantages have been discovered, the old disadvantages for the European, anticipated by the early travelers, have proven unfounded. During ten years' occupation by white settlers of the highland region, there has been little to indicate any serious drawback to European occupation. The death rate is not abnormal and children are born and reared with every success. As in most new lands, a few deaths in succession from local causes arouse the fears of newcomers; but apart from a few cases of malaria, mostly of a very mild type and rarely fatal, no disease has proven to be a serious bar to permanent settlement by European families. This particularly applies to the highlands. At the coast, on the shores of Victoria Nyanza, and in Uganda itself, some risk is present. But even there the conditions are remarkably favorable when compared with other regions under similar conditions. Mombasa, the port of the Protectorate, is in the same latitude as Ceara in Northern Brazil, and the French Congo Coast. It is on a low-lying island, not five degrees from the Equator, and has no range of mountains adjacent to affect the temperature and climate. It is an Arab and Indian town of ancient repute and mostly consists of numerous narrow streets so typical of the East, with a large native African population; yet it is comparatively healthful for the European and is safe for the visitor, if trying climatically to the European resident. On the western coast of the Protectorate, the Lake Victoria littoral, conditions prevail similar to those in Mombasa, though the natives at the lake have been sufferers from sleeping sickness and an occasional, though not very serious, visitation of the plague. Neither of these dread diseases affects the European; it is extremely rare for a European to contract either disease.

The contour of this land between the ocean and the lake, as shown by the railway elevations, is remarkable. By rail, the traveler rises rapidly from the coast, without climbing any defined mountain range, until at Nairobi, 300 miles distant, he is at an altitude of 5,000 feet. Twenty miles farther the railway has climbed to 8,000 feet; then the Rift Valley is approached with a sudden drop of 2,000 to 3,000 feet; again, seventy miles farther, the line attains an altitude of over 8,000 feet, and then, from this crowning elevation, the country suddenly drops to the Lake, another 4,000 to 5,000 feet. It is a country lifted skyward, so to say, with three huge sentinels of snow-capped summits overlooking the whole. At Nairobi, on a clear day, the two mountains, Mount Kilimanjaro and Mount Kenia, though separated by 250 miles, are both seen with the naked eye.

It is on these uplifted highlands, unique in Equatorial Africa, that British settlement is making headway. The farm holdings range from 1,000 to 10,000 acres in area. A few much larger areas are held by certain individuals and companies, notably the East Africa Syndicate in the Highlands at Lake Naivasha, and the East African Estates along the Coast, the latter with 100 square miles of country. Lord Delamere has something like 100,000 acres, and a few others have 20,000 and 50,000. But, for the most part, the men who are resident and working the land are satisfied with from 2,000 to 5,000 acres. The larger tracts are held mainly by graziers and sheep farmers. It is a question which of these two classes is making the larger progress. The cattle or dairy farmer finds grazing in almost any portion of these highlands of a quality that can scarcely be surpassed in any other country. Generally speaking, the pastures are good throughout the year, as, excepting in the highest settled altitudes of over 8,000 feet, there is no frost, and at this altitude frost is light and infrequent. Cattle, poor in flesh or underfed, are almost unknown. Another great advantage to the stock breeder is the remarkable adaptability of the native humped or Indian cattle to grading. A half bred animal loses most of the characteristics of its native strain and approximates the thorough-bred side of its derivation. The two-third grade are not distinguishable from the pure Ayrshire, Devon or Shorthorn, except by an expert. Hence almost all the cattle farmers have graded up from the native stock by pure bred bulls, and the need of a pure bred imported herd to breed from is not felt. The increase is also good, and the milking qualities, if not quite so rapidly developed by grading as beef quality and form, are yet well sustained.

This is the bright side of the picture. The other aspect is the presence of disease. For the last few years East Coast fever and gastro enteritis have ravaged the stock, also a form of rinderpest. These diseases, despite all efforts, are not yet subdued. Some farmers have lost as much as fifty per cent. by these scourges; others have suffered no loss. But it speaks well for the land and the ranching industry that, despite disease, there is no diminution of cattle. On the contrary, a good increase is shown; and the price of cattle has not fallen during the long spell of disease. There has been no panic, and the farmer has shown no signs of abandoning his pursuit of ranching. The prices have been well maintained, not on account of scarcity of stock, but because the holders of cattle are, as a rule, not sellers, but buyers. A cattle sale always draws a crowd, and the prices current are £10 per half bred cow and calf, or in calf; £6 to £8 per native heifer or cow; and from £3 to £5 for steers or oxen. The new-comer and the resident farmer who is founding a herd, are the factors in the maintenance of prices, and good authorities believe that comparatively high prices will continue for some years.

A fact that encourages stock raising has been the establishment and intelligent up-keep of a government cattle experimental farm. One is at Morendat, in the Rift Valley, near Lake Naivasha. Although not an ideal cattle country, but a good sheep run, this spot was selected for its convenience, and its general excellence. Here, for some years, experiments have been made in crossing the native breed with various pure bred strains. The results have been deemed remarkable by every visitor who has inspected the resultant stock. The apparent difference, in size, shape and weight, between the pure bred Hereford, and Shorthorn bull, and the half bred animal, is scarcely noticeable. The three-fourths grade is practically like the



British East Africa.

original pure bred. Hence the policy of the farmer has been to secure as many good native heifers as possible, and grade up with pure bred bulls or even three-fourths bred. Many of the natives have great herds of cattle. A large proportion of these herds show a natural immunity from tropical diseases which enables them to resist diseases which are common in tropical Africa. They have suffered large losses through neglect of proper precautions but these outbreaks of disease have not been very disastrous.

Sheep breeding on the other hand, is little affected by diseases. The sheep farmer has very good prospects before him. Wool has for some time been exported. The cross of the native sheep with the Merino, Lincoln, and Suffolk strains has been very successful. The progeny of the hairy native ewes exhibit a fair fleece at first cross. The two-thirds bred have the appearance of the pure bred strain, and the seven-eighths cross is not to be distinguished from the thoroughbred, the wool staple, only after close commercial examination, showing somewhat inferior, and the market value being very slightly less than the pure bred.

In pure agriculture the most successful permanent crop in the Highlands of high value, is coffee. Coffee plantations are now yielding very good incomes to their owners, and the industry, though only in its infancy, is still sufficiently advanced to be classed as a proved commercial success. The local demand has long been satisfied, and exports are now regular and increasing. The coffee bush, up to the present, has suffered no disease or disaster, such as overcame the industry in Ceylon, and elsewhere. Coffee cultivation is easy and the plant requires very small care. The returns per acre are, of course, higher than fair crops of a coarser character. Most of the coffee plantations are in the neighborhood of Nairobi, the capital.

Another valuable cultivation is that of black wattle. These plantations are now developing everywhere within the prescribed altitude of its growth. Samples of East African wattle bark have been tested by Professor Dunstan of the Imperial Institute, London. The tannin qualities are proved to be higher than the Natal product and only exceeded by some of the best kinds grown in Australia. But this industry has not yet proved its value in the same sense as those above mentioned. The plantations are as yet only three or four years old, but the trees are five to seven years in maturing.

A considerable amount of capital has been put into sisal, which, although much of it has been exported, has yet to be proven sufficiently profitable. There are several large fiber estates, both sisal and the native sansiviera, and a species of wild banana hemp fiber is considered by many authorities to be of greater value than either of the others. Experimental plantations of the banana fiber have been planted and matured, but this class of product will probably await the right decorticating machine before being accepted as a staple commercial proposition.

On the coast strip, are several rubber estates. These are mostly owned by London Companies. Exports of rubber from the Ceara plant have followed their establishment, but the industry is still in its early struggle though its success seems assured.

In the highlands, hog raising has reached the stage where the erection of an up-to-date bacon factory is worth while. Hogs, it is asserted, may be reared more cheaply in East Africa than anywhere else in the world, as natural food is abundant, and the plentiful crops of maize and matama provide good artificial feeding. Ostrich farming is another proven source of income. The wild bird is comparatively abundant, is rigidly preserved, and by the capture of young birds and eggs, many of the farmers have acquired considerable herds. Feathers are now regularly exported.

In this remarkably diversified land the wheat crop is another growing source of income. Local wheat has now taken the place of the imported variety, and the wheat fields of Njoro, a great rolling tract of splendid soil, are ploughed and cultivated for miles. Some export of wheat is now being attempted.

On the northern borders of the territory, towards the coast, some large tracts of country have been taken up by capitalists and by Manchester cotton firms for the growing of cotton. The country in these parts lends itself to easy irrigation, while water transportation is available from the interior to the coast. In two other directions the capacity of the soil demands mention. Potatoes are always a safe crop. Many tons have been exported, principally to South Africa. Some shipments have realized good profits for their owners, while in many cases the cost of transportation has proven an effective barrier to profit.

One little region, at least, has proved itself a rich orchard district, namely Machako's, about twenty miles east of the railway and forty miles from Nairobi. Mr. and Mrs. Langridge's farm produces tons of fruit every year, a part of the crop being consumed locally and the balance going to the port to supply the shipping. The apples are large and have excellent eating qualities. Plums and apricots vie in size and flavor with some of the best in any market. Fruit culture has also been successfully tried in other districts, but it is too early to regard this industry as a future source of supply for oversea markets.

A remarkable feature of the country's development is the rapid growth of settlement on the Guaso-Ngishu Plateau, a large region east of Mount Elgon and about ninety miles north of the railway. This large district has been occupied, mainly by South Africans, well-to-do Dutch immigrants. One or two pioneers from South Africa spied out the land, told their friends about it and thus attracted quite a large community. Although so far from the railway, the land has been eagerly taken up, in preference to other tracts nearer civilization. The climate is deemed perfect by all who have visited this region. Horses thrive there and cattle increase greatly. It is good for sheep and also for cultivation. It has become within the past two or three years one of the best populated districts in the country.

The market price of land in British East Africa varies greatly. There are still large areas of government land available, but the slow method of survey and allotment tries the patience of the immigrant. Occupied farms vary in price from six shillings to £2 per acre, the latter only given for proved coffee and wattle land. The prevailing figure is ten shillings per acre for 2,000 to 5,000 acre holdings. Guaso-Ngishu farms are now realizing this figure and, in a few years, prices will doubtless tend to rise.

All the world knows that the Protectorate is one of the chief homes of big game. Parties of sportsmen annually visit the country and it cannot be said, up to the present, that the quantity of game has been seriously depleted. The same amount of sport may still be obtained, though it is inevitable that, in a comparatively short time, the game will be driven from the vicinity of settlements. Since Mr. Roosevelt's departure several sportsmen have suffered from their temerity in lion shooting. During the last twelve months two or three deaths have resulted from these encounters. Elephants are well protected by the Game Laws and shooting is limited chiefly to the big bulls. Small ivory is confiscated and culprits guilty of killing young elephants are heavily fined.

Rhinoceroses are likely to disappear first, but hordes of antelope of every variety will long roam the great uplands and the wild and drier tracts of the back country. Around Nairobi itself and other settlements game is still plentiful.

The town and trade of Nairobi are gradually becoming more European. A whole street of town lots were recently put up at auction, realizing what is considered here as high prices. The plots were about fifty feet front, and seventy-five feet deep, the prices ranging from £150 to £300 per lot. Back lots may, however, be purchased at a much cheaper rate, while suburban areas range from £20 to £100 per acre. Real estate speculation is as yet very restricted, as the population is still small; but a good deal of the land is firmly held. All Government land is subject to development conditions, and the prevailing title is that of the 99 year lease; but the land law is still in a state of evolution, and the question of title is one which excites much political controversy. Freehold is obtainable on areas of about 360 acres; but grants of 5,000 acres are given on a 99 year lease.

The large native population, mostly confined to reserves, is said to number about 4,000,000. They provide the labor needed and thus far there have been few labor difficulties. The prevailing rate of pay is from four to eight rupees a month for unskilled labor, say from one to two dollars and the native provides his own food. The service, of course, is very crude, but the native speedily learns most unskilled vocations. Natives, also, are found working as masons, painters, printers, carpenters, and at other trades. One of the aims of the Education Board is to encourage the teaching of crafts by missionary and private employers. But the greater number of the skilled artisans are East Indians who are also prominent in commercial life. There is a considerable Indian population in the highlands, and on the Coast where they blend with the Arab and Swahili (native Mohammedans). A few of the largest firms and many of the smaller ones are Indian, and the same people do most of the up-country trading. Yet the European, despite pessimistic and alarmist utterances, is found to compete very successfully with the Asiatic. The tendency is towards a reduction of the Indian and an increase of the European firms.

With regard to the future of the country, it is not too rash to predict considerable prosperity. British East Africa is far richer in soil and production than any portion of South Africa, Rhodesia included. There have been no mineral discoveries of economic importance; but the soil in most parts is rich, and pasturage for cattle and sheep seldom fails from one year end to another. There is no winter and, in the highlands, no extreme tropical heat. Hail and thunder-storms are seldom experienced. Rain is plentiful and fairly regular as to season. The range of products in this comparatively small country is remarkable—from wheat and potatoes to cocoanuts; from sheep, horse, and mule-breeding, to ostriches. So many products are now being grown commercially, with the country only partially settled and not yet started on systematic cultivation in a broad sense, that the future is bound to see large industrial development. Capital today is very scarce. Bank interest is scarcely below 8 per cent., and mortgages earn 10 per cent. Within a few years, there is little doubt that in many directions property will appreciate. The entire European population today is only between 2,000 to 3,000, of whom one-third are living at Nairobi. There does not seem to be any prospect of an immediate "boom" or rush, though new arrivals are slowly, but steadily, coming in. The departures from the land of those who have already settled are very few. Those who live in British East Africa seem to like it on first experience and have seldom found reason to change their minds. A considerable proportion of the settlers consists of persons who have visited the country on a shooting trip, become enamoured of it, and so decided to acquire land and settle. The soil being very bounteous, living is not expensive, and the table is well supplied with a large variety of foodstuffs grown in the country.

Imported articles, however, are dear, on account, first, of the heavy freight charges on over-sea goods (a fruitful topic for the local Chamber of Commerce, and it is hoped that the situation may soon be remedied); and second, the limited market open to storekeepers, who, having no quick returns, are unable to live on small profits. The country is only in its initial stage. The people rely for future economic growth, first upon the expansion of exports, and, second upon the fine climate which is attracting settlers and will attract more and more of them.

The Protectorate is governed strictly from the Colonial Office, through a Governor, Executive Council and Legislative Council. Three or four members of the Legislature are named by the public; all the other officials are Government servants. A movement is already on foot among the European settlers to demand that the nominees to the Legislative Council should be selected by the people. A grant in aid from the Imperial Government amounting to from £115,000 to £150,000 per annum reinforces the annual revenue, but the expenditure on the military service and the administration of the northern border very nearly balance this Imperial subvention.

A loan of £250,000 has been granted to the colony by the home government to be spent partly on a line of feeder railway making towards the Mount Kenia district from the trunk line at Nairobi. Some of the finest land in the country is in this direction and the amount of grain grown among the natives around Kenia is known to be very great. There also are some large European planters of beans and sisal. The second project which this money will also cover is a deep water pier at the port, a comparatively simple engineering undertaking in view of the closeness and depth of the channel, ships of over 6,000 tons now anchoring almost within hail of shore.

DEVELOPMENT OF WHEAT PRODUCTION IN CANADA

BY

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A large area of the Canadian Northwest forms a part of one of three or four regions which give promise of furnishing a great surplus of wheat. In a paper* on the future wheat supply of the United States read before the Millers' National Federation Mass Convention at Minneapolis on June 22d, 1910, Mr. M. A. Carleton, of the U. S. Department of Agriculture, said that "a careful study of the conditions in Canada reveals a possibility in increased production far ahead of any other present exporting country." Many other authorities substantially agree with Mr. Carleton. Some writers have attempted to figure out the yield at a more or less remote date, with results that differ widely. It is futile to undertake to measure exactly the future wheat crop, although it is generally agreed that within a few years it will probably permit the exportation of several hundred million bushels annually. Already the yield is important though only a fraction of the wheat belt in the prairie provinces has yet been cropped. The maximum harvest was obtained in 1909 when 166,744,000 bushels were reported. This gave the Dominion seventh place in wheat production, it being surpassed only by Russia, the United States, France, India, Italy and Austria-

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***Science*, Aug. 5, 1910.

Hungary. This paper aims to present a concise and reliable statement of the history and present situation regarding wheat production in Canada.

Information as to the area sown to wheat and the yield previous to 1882 is very scanty. In that year, the government of Ontario undertook to compile statistics annually relating to wheat production in the province. The following year a similar plan was adopted by Manitoba, and later, the other provinces undertook the same work. But, until 1882 and 1883, practically the only information regarding wheat production, apart from newspaper reports, was obtained at intervals of ten years when the census was taken. More recently the Department of Agriculture at Ottawa has been issuing, through the Census and Statistics Office, official statements of the field crops in which wheat is included. In 1906, under the authority of an act of the Dominion parliament, a census of population and agriculture was taken in Manitoba, Saskatchewan, and Alberta. An exceedingly interesting and valuable report has been issued showing the results of this work. This is the first of a series of similar reports on these three provinces to be made at ten year intervals, in addition to the regular decennial census for the whole Dominion such as was taken during the year 1911. The figures of the provincial governments showing areas and total products vary considerably from those found in the census reports. In general, but not always, the former are larger than the latter. We have here followed rather consistently the various official reports of the federal census office, believing that, on the whole, they are the more nearly correct.

According to the census of 1871, the total area devoted to wheat in Nova Scotia, New Brunswick, Quebec, and Ontario was 1,646,781 acres, and the aggregate yield was only 16,723,873 bushels. At this time the output of the rest of British North America appears to have been of such minor importance that it was not taken into consideration. The real Canadian wheat belt still remained in a state of nature. Ten years later the crop had just about doubled. At the end of another decade, in 1890, the area had increased to 2,723,861 acres and the yield to 42,144,629 bushels. In the whole Northwest (exclusive of Manitoba) the land sown to wheat amounted to only 113,811 acres and the output was but 1,792,409 bushels—about one twenty-fourth of the yield for the whole country.

With the later movement of population into what are now the provinces of Manitoba, Saskatchewan, and Alberta the center of wheat production for the whole Dominion has shifted westward also, until it is now within the limits of these three provinces. This is shown by the fact that, in 1909, their combined crop was 147,482,000 bushels out of a grand total of 166,744,000 for the whole country. It is thus seen that great changes in the production of this cereal have been brought about during the last twenty or thirty years, and that a discussion of Canadian wheat production to-day must of necessity be centered around the prairie provinces. It seems desirable at first, however, briefly to outline the history and present condition of the industry in the rest of the Dominion.

In the Maritime Provinces the total output has always been relatively small. As a whole, they show a decline both in acreage and in total production, although the yield per acre has increased considerably. In Nova Scotia, only 21,000 acres were sown to wheat in 1910 as compared with nearly twice this area in 1880. The output, however, amounted to 480,000 bushels, while 529,251 bushels were reported for 1880 on the much larger acreage. During the last ten years more attention has been given to wheat culture so that the province now is a little less dependent upon the West for flour than it was ten or a dozen years ago. In New Brunswick, the decline in acreage has been fairly constant; 40,336 acres were cropped in 1880 as compared with 19,500 in 1910. The yield in 1910 was 371,000 bushels against 521,956 thirty years earlier. The figure showing the output in 1910 is less than that of any census year since 1881, with the exception of 1891, when the total crop was 209,809 bushels from 17,306 acres. Prince Edward Island, on the other hand, has been increasing its production slightly. In 1880, the acreage was 41,942, and it has shown no important change in any census year; but in 1910 it had fallen to 30,000 acres. The output has been increasing, 615,000 bushels being reported in 1910 as compared with 546,986 on a much larger area in 1880. The yield in 1900 was 736,679 bushels from 42,318 acres. Practically the whole output of the Maritime Provinces is spring wheat.

In British Columbia also the amount of wheat raised has always been relatively insignificant. The census of 1881 showed an acreage of 7,952, which was doubled ten years later, and still remained about the same at the census of 1901. This census showed a crop of 360,000 bushels, whereas, twenty years earlier, it was only 173,653 bushels.

In Quebec, the decline in acreage has been steady, but the average yield per acre has increased, so that a diminishing area has given a fairly steady output, which does not vary greatly from 2,000,000 bushels. In 1910, 99,400 acres produced 1,827,000 bushels, while, thirty years earlier, an area of 223,176 acres yielded but 2,019,004 bushels. Evidently, there has been considerable improvement in farming methods within the province.

Until about the beginning of the present century Ontario was the principal wheat province of the Dominion; but Manitoba, at first, and Saskatchewan, later, came to occupy this position. Between 1880 and 1900, no serious change either in the acreage or production of Ontario is to be noted, although the tendency was toward a decrease in the area sown to wheat. Over 27,000,000 bushels were taken from 1,930,123 acres in 1880 and nearly 28,500,000 bushels from 1,489,633 acres in 1900. But there has been a noticeable decrease both in acreage and production during the last ten years. In 1910, the area cropped was only 729,500 acres and the yield was 17,805,000 bushels. The decline in acreage in both Quebec and Ontario was contemporaneous with the spread of wheat culture into the prairie provinces. In spite of the adaptability of soil and climatic conditions in Ontario for the growth of this cereal, the output has declined both relatively and absolutely on account of the competition of the West. It pays the Ontario farmer better to follow dairying, fruit-growing, or mixed farming and leave the raising of most of the wheat to his fellow countrymen who are coming into the possession of the real Canadian wheat belt on the western prairies. This statement, with certain limitations, may be applied to practically all the provinces so far considered.

The three northwestern provinces within which the famous Canadian wheat belt is located are Manitoba, Saskatchewan, and Alberta. With a combined area of 369,869,898 acres, they are more than four and three-fourths times the size of the United Kingdom, and more extensive by nearly 3,500,000 acres than the combined areas of the United Kingdom, Germany, France, Belgium, Holland, and Denmark.* The largest province is Alberta, which contains 162,265,600 acres—nearly two million more than Saskatchewan. Or, to make still other comparisons, Alberta is about twice as large as Great Britain and Ireland, and much larger than either Germany or France. Manitoba is relatively small, being less than one-third the size of either of the other provinces.

On the whole, the climate is well adapted to wheat culture. Of course, there are various drawbacks, such as hail-storms, frosts, etc., which, at times, are the causes of loss to the farmers, though they rarely bring about a complete failure of the crops. It is now possible also, to procure insurance against all such losses. An insurance policy, for example, may be purchased for a moderate sum

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*See *Census of Population and Agriculture of the Northwest Provinces*, 1906, p. xxii.

which will guarantee indemnity for losses from hailstorms. Then, dangers of frosts occurring before harvest time are constantly being minimized by the breeding and selection of hardy varieties of wheat for seed. The soil throughout large areas is unexcelled for wheat raising. Broadly considered, there are large portions of Central Canada whose soil is a rich black loam, and whose sub-soil is clay which is capable of retaining considerable moisture.

The estimates as to the amount of land available for wheat raising vary from over 170,000,000 to less than 50,000,000 acres. The latter, however, does not take into consideration some 47,000,000 acres which are reported to be excellently adapted for mixed farming, of which the raising of wheat would probably be an important activity. Nearly two-thirds of the enormous province of Saskatchewan is within the Canadian wheat belt, to say nothing of the large areas of Manitoba and Alberta which already have produced millions of bushels annually, and of still larger areas of excellent wheat lands which are merely waiting for settlers. But, with the data available at present, it is as futile to attempt to figure out with exactness the wheat area in this region as it would be to predict the total yield at some more or less remote date. What we do know, however, is that, stretching through the hearts of Manitoba, Saskatchewan, and Alberta for several hundred miles, is a wheat belt of some 200 miles or more in width which, judging from the results already obtained, is not excelled for wheat raising by any other similar area. For many years to come, there need be no particular concern on the part of intending settlers as to the exact area of this region, for there is still plenty of virgin soil. Less than 10,000,000 acres have been planted in any single year, and this is but a small proportion of the available area, according to conservative estimates. Lying entirely outside of the wheat belt proper, there are millions of acres which undoubtedly can be cultivated with profit by wheat farmers and by others who choose to carry on mixed farming. Until recently, the idea of utilizing these outlying lands had scarcely occurred to anyone, it being taken for granted that agriculture was forbidden to these regions on account of a too rigorous climate. The error of such preconceived notions is becoming apparent as the knowledge of the country increases.

Manitoba, being the easternmost of the three wheat provinces, was naturally the first to have its rich lands exploited. The movement did not begin, however, until the last quarter of the nineteenth century. We have seen that at the census of 1871 no wheat was reported west of Ontario. At that time the population of Manitoba was only about 25,000, of which nearly one-half were Indians. Ten years later it had increased to upwards of 62,000 and about a million bushels of wheat were being raised. At the close of the next decade, the population numbered 152,000, and the amount of wheat harvested, according to the census, was about 16,000,000 bushels—the largest crop of any year to that date. The closing decade of the century saw no striking changes either in acreage or production, although there was an increase in both. The wheat crops of the Northwest were a partial failure in 1900, owing to a long-continued drought throughout the growing months, so that in Manitoba only 18,353,000 bushels were obtained from 1,965,000 acres. Since the opening of the present century, however, the progress has been rapid. The acreage has increased steadily, until it passed the three million mark in 1910, and the annual yield, though subject to considerable variation, has amounted to nearly 55,000,000 bushels. Practically the entire output is spring wheat; in both Manitoba and Saskatchewan, the growth of fall varieties has, as yet, hardly passed the experimental stages, but the results obtained are promising.

Although the development of wheat production in Manitoba has been rapid, especially within recent years, it has been relatively slow as compared with the progress made in the neighboring province of Saskatchewan. As late as 1880, so few settlers had gone west of Manitoba that, in the entire region now included within Saskatchewan and Alberta, less than 120,000 bushels of wheat were being raised. But it was inevitable that the settlement and exploitation of their excellent lands should soon begin. Progress was slow, however, until the very close of the Nineteenth century, when, in what is now the province of Saskatchewan, some 487,000 acres were sown to wheat and about 4,306,000 bushels were harvested. Since then, the figures showing both the acreage and output have increased at a phenomenal rate, until, in 1910, the former had risen to 4,848,000 and the latter to 81,139,000. The area sown to wheat in the present year (1911) is even greater, for it embraces 5,715,900 acres and there are prospects of a good harvest. A similar enormous increase in output of other agricultural products also has taken place due, as in the case of wheat, to the very rapid settlement of the province. At the present day, Saskatchewan occupies the first place among the provinces of Canada in wheat production, having succeeded to Manitoba in 1909.

Alberta, being the farthest west of the prairie provinces, was, quite naturally, the last to be affected by the tide of immigration. This is one of the reasons why the portion of the great Canadian wheat belt which is contained within this province has, as yet, contributed but little toward the total wheat crop of the Dominion. Another reason which should not be overlooked is that conditions here are especially favorable for ranching. In the West, horse ranching has been confined almost solely to Alberta, and cattle ranching also is practiced even more than in Saskatchewan, the next important seat of the industry. In the case of all farm animals excepting the pig, more have been reported per farm from Alberta than from either of the other prairie provinces—an indication of the greater adaptability of the former to the rearing of live stock. With reference to the raising of wheat, the climatic conditions are favorable to the growth of both spring and fall varieties, although the former have always figured most conspicuously in the total output. Wheat-raising in Alberta for commercial purposes may be said to date back for only little more than ten years. In 1900, only 43,000 acres were cropped and the total output was under 800,000 bushels. Since then the development has been slow but steady. At present about 650,000 acres are devoted to the cereal annually; the largest crop of any single year was harvested in 1909, amounting to 9,579,000 bushels. This was greater by nearly one-third than that of any other year up to the present time, but it is small as compared with Saskatchewan's crop of 85,197,000 bushels or Manitoba's 52,706,000 bushels in the same year.

These facts show the westward march of wheat production in Canada, and the rapid strides which the Northwest, as a whole, has been making with respect to wheat raising, especially during the last ten years. To summarize the situation exactly as it has been, for the whole region as well as for the separate provinces, the following table, compiled from official sources, is added:

COMPARATIVE AREAS AND YIELDS OF WHEAT IN THE NORTHWEST PROVINCES FOR THE YEARS MENTIONED.

WHEAT	*1911*	*1910*	*1909*	*1908*	*1906*	*1900*
Northwest Provinces:						
Acres	9,592,900	8,395,400	6,878,000	5,624,000	5,062,493	2,495,466
Bushels	....	128,891,000	147,482,000	91,853,000	110,586,824	23,456,859
Manitoba:						
Acres	3,223,900	3,014,400	2,808,000	2,957,000	2,721,079	1,965,193
Bushels	....	41,159,000	52,706,000	50,269,000	54,472,198	18,352,929
Saskatchewan:						
Acres	5,715,900	4,848,000	3,685,000	2,396,000	2,117,484	487,170
Bushels	....	81,139,000	85,197,000	34,742,000	50,182,359	4,306,091
Alberta:						
Acres	653,100	533,000	385,000	271,000	223,930	43,103
Bushels	....	6,593,000	9,579,000	6,842,000	5,932,267	797,839

In spite of the rapid development of the wheat-raising industry, it is to be remembered that Canada's maximum yield is relatively small when brought into comparison with that of the United States. The 166,744,000 bushels of 1909 is not such an enormous quantity after all when balanced against the 713,000,000 bushels of the latter country in the same year. Besides, so much is heard nowadays about the great Canadian wheat fields and their wonderful harvests that one is likely to forget that as early as 1867 the United States was producing a wheat crop larger than the average Canadian crop of the present day. But that which fans the enthusiasm of the people of the western provinces as well as that of prospective settlers is not so much what has already been accomplished as the bright prospects for the future. On both sides of the international boundary line it is just beginning to be realized that a large, if not the best, part of the natural wheat area of this continent lies to the northward of the forty-ninth parallel of latitude. The Canadians are justly proud of the results already achieved in the evolution of their wheat industry; but, though the prospects of expansion during the next decades are full of promise, the time by no means is in sight as yet when their ambition to lead the world in the output of this cereal will become a reality.

LATEST HIMALAYAN EXPLORATIONS OF THE WORKMANS*

Dr. W. Hunter Workman and Mrs. F. Bullock Workman have recently returned to India from their seventh Himalayan expedition. They have explored the region, much of it virgin ground, south of the Baltoro glacier in Baltistan lying between that glacier and the Shyok and Saltoro valleys, and extending from a line some distance west of the meridian of Masherbrum to the Kondus-Siachen watershed on the east; embracing the Kondus and Hushe river-basins and the glaciers tributary to them. The whole region is covered with giant mountains, 21,000 to over 25,000 feet high, enclosing between their steep and, in places, perpendicular walls, large, sharply descending glaciers. Seven glaciers were explored, of which four were mapped. No traces of three passes reputed to lead from this region to the Baltoro could be found, all glacier-reservoirs being enclosed by abrupt, unscalable rock-walls in which no openings exist, and the upper portion of most of the glaciers are of such steep incline and so crevassed and broken into séracs as to be impassable.

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* Dr. W. Hunter Workman has sent to the *Bulletin* the following summary of the explorations of Mrs. Workman and himself, during the past season, in the region of great glaciers and lofty summits embraced between 34°–36° N. Lat. and 76°–78° E. Long.

After the exploration of this district was concluded, the Bilapho glacier still farther east, some 20 miles long, the surface of which is greatly broken and moraine-covered, was ascended to the ice-covered pass at its head, about 18,550 feet above sea-level as determined by boiling point readings compared with simultaneous ones at the lower Government Meteorological Station at Skardo. From this pass a broad glacier about fifteen miles long was descended, leading to the great Siachen glacier discovered in 1909 by Dr. T. G. Longstaff, who with two companions and coolies descended by the same route to its edge, where they remained one day and then retraced their steps over the Bilapho Pass, neither ascending nor descending the Siachen from the point where they reached it.

The expedition on reaching the Siachen at a point about 16,000 feet in altitude and some twenty miles from its source, established a base camp on a projecting spur, from which further exploration was carried out.

The Siachen glacier, the largest mountain glacier yet discovered in Asia, has a probable length of fifty miles, if not more. Its upper half has a very complicated topography, drains a great area, and is fed by seven large branches nearly as wide as the main stream. Two of the latter were ascended, the first to a point at its source, fifteen miles above its junction with the main glacier on the flank of the giant-peak K3 at an altitude of 20,000 feet, above which a perpendicular rock-precipice rises to the summit 24,415 feet in height; the second, after a distance of twenty-five miles, opening into an extensive ice-plateau lying at and above an altitude of 19,000 feet, which stretches out ten to fifteen miles farther to a snow pass descending to the east towards the Karakoram Pass. Besides these large branches, innumerable smaller ones descend to and feed the glaciers from the mountains rising above it.

The highest mountains lie to the west of the glacier on the border of the region earlier explored by the expedition and far to the north, where the Siachen approaches the head of the Baltoro, many of them rising as separate peaks or massifs of great size. One of the most impressive of these is the peak K3, with two summits, of 25,210 and 25,415 feet respectively, marked on the Survey map as two separate peaks, which dominates not only the Siachen but also the Dong Dong and the upper end of the Bilapho glacier.

Three elevations on the northeastern wall of the Siachen, one of which (it is not certain from his description, map, and photos, which) was named by Dr. Longstaff, Teram Kangri, were triangulated with theodolite by Dr. Calciati. His final figures are not yet rendered, but preliminary calculations indicate that the altitude of the highest of these will not vary far from 24,000 feet, quite a difference from the altitude assigned by Dr. Longstaff to Teram Kangri of over 30,000 feet as worked out by the Indian Survey from some angles taken by him with a clinometer from three points, which impossible height Dr. Longstaff reduced to 27,610 feet. A triangulation of the same three elevations has been made the past season from four trigonometrical stations south of the Siachen, with results not very different from those obtained by Dr. Calciati. So far as known, the exact figures of the Survey measurement have not been published, but Teram Kangri can no longer be counted among the Himalayan peaks of the first class.

The expedition reached the Siachen on Aug. 19, rather late in the season for the exploration of a large glacier, especially when the only avenue of retreat in the case of bad weather was over a high and, in that case, dangerous snow-pass. As the weather proved favorable, several days together being cloudless, a month was spent in a first exploration of a large portion of the upper half of this most interesting giant among glaciers, although the immediate examination of its ultimate sources extending high up into the region of eternal snows had to be omitted on account of the shortening days and long nights. For the same reason the cold became rather trying, especially when the wind was strong. On several occasions a temperature of 5° F. was recorded at 16,000 feet.

Among other high points attained was the summit of a sharp peak of 21,000 feet, commanding an extended view of 35 miles of the Siachen as well as of its wonderful entourage of mountains. During the month spent on the glacier all camps were made at altitudes of from 16,000 to over 19,000 feet.

Many interesting observations were made, not only of a geographical and physiographical nature, but also regarding the structure and surface-formations of glaciers, of which the Siachen furnishes examples striking to an unusual degree. Some of these observations relate to phenomena not yet, so far as known, brought forward. A large collection of photographs, panoramas, and telephotographs was secured.

PRELIMINARY REPORT OF THE YALE PERUVIAN EXPEDITION

BY

PROFESSOR HIRAM BINGHAM, DIRECTOR

The Peruvian Expedition, as approved by the Yale Corporation, consisted of seven men: Professor Hiram Bingham, Director, Professor Isaiah Bowman, Geologist-Geographer, Professor H. W. Foote, Collector-Naturalist, Dr. Wm. G. Erving, Surgeon, Mr. Kai Hendriksen, Topographer, Mr. H. L. Tucker, Archæological Engineer, and Mr. P. B. Lanius, Assistant.

We landed at Mollendo, the chief seaport of southern Peru, in June, 1911, and went at once to Cuzco, the old Inca capital. The first field of operations was the Urubamba River and its affluents, including the hitherto unknown Rio Pampaconas. The second was a cross-section from the head of canoe navigation on the Urubamba south over the Andes to the Pacific Ocean. The third was the neighborhood of Mount Coropuna and Lake Parinacochas. For this last, Arequipa was used as a base. The field work occupied five months. The expedition was divided into three parties to do archæological, geological and topographical exploration.

The Peruvian Government, acting on the initiative of President Leguia, gave the expedition free entry for all their supplies and loaned the services of several soldiers and non-commissioned officers. Through the courtesy of President Taft, the United States Coast and Geodetic Survey and the Geological Survey loaned the necessary topographical instruments, and the Army a complete medical equipment, including typhoid vaccine.

The topographical work was in charge of Mr. Kai Hendriksen, formerly of the University of Copenhagen, and later of the United Coast and Geodetic Survey on the Canadian boundary.

Mr. Hendriksen reports that he made seventeen topographic maps, took fifteen observations for latitude and twenty-seven observations for longitude and made several plans of ruins. The following maps are the results of his surveys:

"One detailed topographic map covering 50 square miles (scale 1:45,000; relief in contours, interval 100 feet), showing characteristic physiography of Central Andes, west of Cuzco. Astronomical basis: One observation for latitude, two observations for azimuth and longitude.

One detailed topographic map covering region 1½ miles long, ½ mile wide (scale 1 in.=300 feet [1:3,600]; contour interval, 20 feet, in places, 5 feet), of *quebrada* near Cuzco, where interesting bones and ash-deposits were found. The map shows bench marks to which photographs and discoveries were tied.

One detailed topographic map covering region 2 miles long, 1 mile wide (scale 1:9,000; contour interval, 20 feet), of Cuzco and vicinity. Shows the above-mentioned *quebrada* and the famous ruins near Cuzco.

One topographic map (standard*) (covering region about 30 miles long, 5 to 10 miles wide) of the Urubamba valley from Piscocucho to Mandor Pampa. The map shows the position of most of the ruins found in the Urubamba valley. Jungle in the greater part of the valley. Astronomical basis: One observation for latitude, two observations for azimuth and longitude.

One topographic map (standard) (covering region about 30 miles long, about 5 miles wide) of the Vilcabamba valley from Chaullai to Vilcabamba. Jungle in the lower part of the valley. Astronomical basis: One observation for latitude, two observations for azimuth and longitude.

One route-survey, with astronomical positions, about 60 miles long, showing form-lines of about 200 feet difference in elevation. The survey and return was made in ten days on foot from Vilcabamba to Esperitu Bampa, where Inca ruins were found. The trail followed was very narrow through heavy jungle. Much rain. No accurate survey could be made. Directions by prismatic compass, distance by time and pedometer, elevation by aneroid. Astronomical control: Five observations for latitude, eleven observations for azimuth and longitude.

Quick route-survey from Vilcabamba to Abancay (by Prof. I. Bowman). Astronomical basis: Two observations for latitude.

Ten topographic maps (standard), covering region 250 miles long, 5 to 20 miles wide, 40 working days. Cross-section over the Andes from Abencay to the Pacific Coast (Camana). (The map of Coropuna is a part of this map.) Astronomical control: Fifty observations for latitude, ten observations for azimuth and longitude.

One detailed topographic map (scale 1:45,000; contour interval, 100 feet), covering thirty square miles of pass between Lambrama and Chuquibambilla. Shows characteristic glacial topography.

Three large-scale plans of the ruins of Aquente and Torontoy. Measured by tape and stadia, with accurate measurements of each building.

Several accurate measurements of smaller ruins.

All the standard topographic maps are done by exact methods of survey: distances by micrometer screw combined with triangulation, elevations by vertical angle. The distances are determined with an accuracy of 50 to 100 feet, elevations with an accuracy of about 30 feet. The more detailed topographic maps were made by the same method. The two detailed topographic maps on a very large scale, near Cuzco, were made by stadia and vertical angles.

A bathymetric and topographic survey was made of Lake Parinacochas, 11,500 feet above the sea. A folding boat was successfully carried from this country. According to the story given us by the natives, Parinacochas was navigated for the first time. We found its length to be about 17 miles and its width 6 miles. The greatest depth is not over six feet. At the time of our visit in the dry season it had somewhat shrunk so that we failed to find any depth over four feet six inches. A sample of the water was brought home to be analyzed. On the shores of the lake were found many primitive ruins indicating the former presence of a large population.

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* The standard maps of the expedition are: scale 1:90,000; contour interval 200 feet.

Mount Coropuna was successfully climbed by the Director and Mr. H. L. Tucker, and later was triangulated by Mr. Hendriksen. A comparison between the mercurial barometer taken to the top and one read simultaneously in Arequipa, 100 miles away, gave an altitude of 21,640 feet. Mr. Hendriksen's careful survey and triangulation of the mountain from its vicinity to the sea coast raised this estimate to 21,703, with a mean error of 35 feet. The altitude given to Coropuna on the map of Peru by the Royal Geographical Society, 22,799 feet, is thus seen to be more than 1,000 feet too high, and Coropuna, instead of being the highest mountain in America, probably only occupies fourth or fifth place.

The geological and geographical work was in charge of Professor Isaiah Bowman, who makes the following report of his results:

"(1) Geological map across the Andine Cordillera from the mouth of the Timpia southward along the 73d meridian to Camaná on the coast.

(2) Physiographic interpretation of the belt of country traversed.

(3) Meteorological observations along the line of traverse, including notes on wind, clouds, temperature, humidity, etc., and a set of about fifteen daily temperature curves for typical stations.

(4) Notes on the anthropogeography of the natural regions which were crossed, including the relation of the people to the physiography and geology; also trade routes and movements, products, systems of land tenure, rotation of crops on artificial terraces, the rubber industry, and other data of economic geography.

(5) In further explanation of (1) and (2):

(a) Collection of fossils (Devonian, Carboniferous, Cretaceous, and Tertiary, chiefly) from six type localities.

(b) Interpretation of the structure section across the cordillera.

(c) Interpretation of the geology of the Cuzco basin, including the finding of Tertiary fossils and the origin of the famous "Rodadero" wrongly supposed for many years to have been glaciated.

(d) Determination of the level of perpetual snow, and the limits of past glaciation—of special importance in connection with the problem of decreasing level of snow-line towards the equator.

(e) Glacial forms and their interpretation: a study of the effects of glacial erosion in valleys from which the ice of glacial times has been withdrawn. The results of these studies bear out in a striking way the conclusion that ice is a powerful agent of denudation. Special attention was given to the glacial alluvium about Cuzco in order to determine the importance of human remains found therein.

(f) Clear geologic and physiographic evidence of past climatic changes beyond the limits of glaciation, especially in the deep valleys of the Cordillera and in the desert of the coast region.

(g) Evidence that the great coastal terraces have had a complex history, including a submergence in the Tertiary and a later stripping still in progress.

(h) Discovery that the great Tertiary cycle of erosion ending in the formation of well-graded mature slopes affected this region as well as the region farther south studied in the Yale South American Expedition of 1907.

(i) A study of the relation of the forests of the region to water supply slope exposure, and soils.

(j) A set of observations on the temperature of water and air along the Peruvian coast in relation to (1) the counter current sometimes visible, and (2) to the more abundant showers on the coast hills, a feature especially important during the past season.

(k) Topographic sketch map of the Urubamba valley between Rosalina and Pongo de Mainique, indicating the form of the land by contours and showing the positions of a large number of rapids and whirlpools.

(l) Route map across the Cordillera Vilcabamba indicating geologic boundaries and position and relation of the principal glacial forms.

(m) Pleistocene history of the Lake Titicaca basin.

The natural history collections were in charge of Professor H. W. Foote, who makes the following report:

"On the advice of our biological department, collecting was limited mainly to insects and non-flowering plants, including mosses and liver-worts. This was done partly because it was impossible for one man to collect effectively in many different lines and partly because the birds, animals, and flowering plants of Peru are fairly well known, while the orders which were collected were not.

Collecting was chiefly carried on along the valleys of the Urubamba, Vilcabamba, and Pampaconas Rivers, a distance of perhaps 250 miles, from an altitude of over 12,000 feet (at Vilcabamba) to 3,000 feet (Santa Ana). A fair collection was also made about Cuzco. It was the dry season and winter, when insects are not so plentiful as in the wet season when it is warmer. Nevertheless, approximately 3,000 specimens of plants and insects were obtained, besides several hundred land shells.

Little or no collecting has been done before in the districts visited and it is believed that the collection will add materially to our knowledge of geographical distribution. It is also probable that some new species have been obtained. Arrangements have been nearly completed to have the collections investigated by specialists who will publish their reports later. Ultimately, it is hoped to deposit most of the collecton in Peabody Museum."

A few archæological discoveries were made by the Director. Among them are the ruins of a number of Inca or pre-Inca cities, including: (1) Macchu Pichu, a city probably built by the "megalithic race" who preceded the Incas. The ruins are on an almost inaccessible ridge, 2,000 feet above the Urubamba River. They are of great beauty and magnificence and include palaces, baths, temples and about 150 houses. Carefully cut blocks of white granite, some of them twelve feet long, were used in the construction of the walls. The city was surveyed by Messrs. Tucker and Lanius.

(2) The temple of Yuracrumiu, the centre of the Inca religious cult after the fall of Cuzco, containing a carved monolith 185 feet in circumference.

(3) Vitcos, the palace and capital of Manco Capac, the last Inca, probably built after his retreat from before Pizarro's conquering army.

(4) Vilcapampa, a purely Inca town, now completely buried in the dense jungle of the Rio Pampaconas, but containing characteristic Inca pottery, and bronze implements.

(5) A number of other primitive towns in the coastal desert provinces, two of which were marked by volcanic boulders covered with pictographs including drawings of jaguars, llamas, and dancing men.

Near Cuzco a wall was discovered, probably over 100 feet long, partially exposed by recent erosion. Excavation revealed the fact that it was buried beneath six feet of gravel deposited on both sides and on top of it by the action of water. The wall was about four feet in thickness, faced with carefully cut polygonal stones on both sides, the middle being filled in with rubble. As the wall resembles some of the oldest and best-known walls in Cuzco and here was found to be covered by compact gravels, the age of this type of wall will depend largely on the geological evidence regarding the gravel. If this gravel should prove to have been deposited in glacial times it would revise the prevailing notions. The natives generally consider it to be Inca; some scholars regard it as pre-Inca. The geological evidence appears to be decidedly in favor of the latter view.

Human bones were found in the same valley, embedded under seventy-five feet of gravel, interstratified with the gravel beds and with the bones of several lower animals. They were excavated by the Director and Professor Bowman in the presence of Professor Foote, who photographed the bones in position.

Professor Bowman made a detailed study of the geology of the surrounding region and makes the following preliminary report:

"The geographic and geologic study of the bones found near Cuzco indicated that they were contemporaneous with the compact gravels in which they were embedded. They were disposed in the form of a lens about 10 feet long and 6 inches thick. From (1) their disposition with respect to each other (they were jumbled and essentially flat), (2) their relations with the bedding planes (some of which passed directly through the bone deposit), and (3) their worn condition (the finer details are absent), it is concluded that they were interstratified with the gravel beds. The age of the beds thus becomes the determining fact in the interpretation.

"From a detailed study of the geology of the upper Cuzco basin with special reference to glacial forms, it is concluded (1) that the beds belong to the Pleistocene series, (2) that the bones were deposited during a period of pronounced alluviation, and (3) that since the deposition of the bones at least 75 feet of gravel were deposited over them and later partly eroded, an erosion that is still in progress and to whose activity we owe the exposure.

"It should be remembered that while compelled to refer the gravel beds of this locality to the Pleistocene series I have yet to determine their place in that series. When this is done the antiquity of the vertebrate remains may be more safely approximated than now. A provisional estimate would hardly be less than 10,000 years; it could not exceed the maximum glaciation of the last glacial period generally estimated at 75,000 years."

The bones were soaked in melted vaseline, packed in cotton-batting and brought safely to New Haven, where they have been examined by Dr. George F. Eaton, curator of osteology in the Peabody Museum of Yale University. He finds that the fragments represent sixteen distinct bones, including a fragment of a human skull, two imperfect ribs, fragments of a pelvis and femura of at least three individuals. As there are fragments of only eight human bones, it is impossible to say much about the individuals whom they represent. Of the physical characteristics of the one represented by a femur and an associated pelvis Dr. Eaton reports that the following logical inferences may be drawn: "We may reasonably suppose him to have been a remarkably thickset and powerful man about 5 feet and 4 inches (1.625 m.) in height. As his skeletal characters are not sufficiently primitive to differentiate him specifically from *Homo sapiens,* he should be provisionally referred to that species.

Such a course will also comply with your request that the identification of this material should be made without regard to any purely geological indications of age."

Among the eight other fragmentary bones, is a much battered shaft of the left tibia "from the skeleton of a wolf or wolf-like dog." There is also the "cannon bone" of the left hind leg of a bovine animal, together with a fragment of the right radius and a fragment of the first right thoracic rib. While the exact specific identification of the three last named specimens must rest largely on the determination of their geological age, there is no doubt, says Dr. Eaton, that they are either from the Bison, *Bos americanus,* or from one of the closely related species. The remainder of the collection comprises four more or less fragmentary bones that "are confidently referred to *Lama guanacus,* the Guevaco, the feral species from which the domestic breeds of the Llama and Alpaca are supposed to be derived." If these bones do represent the bison, it is, I believe, the first instance from South America.

Although the bones belong, possibly without exception, to the present day fauna of the new world, the geological evidence points to the possibility of the remains being of glacial or inter-glacial time. Further examination of the region where these bones were found is needed before we shall be able to speak more definitely about their age. There have been several reports from placer gold mines in the central Andes of arrow heads and bones having been washed out of what the mining engineers supposed was glacial gravel. But direct evidence for glacial man in South America is so unreliable that reputed discoveries should not be accepted without the utmost caution.

The bones brought home by the expedition will be presented to the Peabody Museum of Yale University, together with photographs taken by Professor Foote. It seems to me quite possible that the bones and the before-mentioned wall will be found to belong to the same geological period, whatever that may be.

In conclusion, it should be remembered that our work was largely reconnaissance exploration. We hope to send out other expeditions to make thorough examination of the more important discoveries.

COMMENT ON COLONEL CLOSE'S ADDRESS ON THE PURPOSE AND POSITION OF GEOGRAPHY

BY

MARTHA KRUG GENTHE, PH.D.

In his presidential address to the geographical section of the British Association on "The Purpose and Position of Geography," which has been published in several geographical periodicals, including this *Bulletin* (Vol. 43, 1911, No. 10, pp. 740-753), Colonel Close has come to the conclusion that geography is not "a unit of science," at least not "in the sense in which geology, astronomy, or chemistry are units," and he substantiates this assertion mainly by an examination of the original contributions to the *Geographical Journal* during the last five years.

When Colonel Close says that the work of the leading British geographical society is "mainly an affair of exploration and surveys" and that the authors who submit their work to it "in so doing appeal rather to the public at large than to men of their own special sciences," because that society serves only "as a popularizing medium," we must leave to him the full responsibility for such a statement. Whatever its validity, however, in so far as it concerns geography in England, it does not follow that conditions must be the same all over the world. Such a sweeping generalization would not hold in any science, and does not in geography.

In order to make possible a fair criticism of the author's statements I shall not at first take exception to his method, but will apply that method to test corresponding conditions on the Continent and in the United States. Choosing for comparison the last five volumes of the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin,* for instance, I find that, of 107 original papers, 27, or 25.2 per cent., deal with travel and exploration, and 20, or 18.7 per cent., with general physical geography. The complete list for the respective sections, following Colonel Close's numeration, is as follows (the figures in parentheses indicating the percentages for the *Geographical Journal*):

CLASSIFICATION OF ORIGINAL PAPERS IN THE ZEITSCHRIFT DER GESELLSCHAFT FÜR ERDKUNDE ZU BERLIN, 1906-1910.

SECTION	SUBJECT	PERCENTAGE	
1	Mathematical and Cartographical Geography	12.0	(3)
2	General Physical Geography	18.7	(10)
3	Vulcanology and Seismology	7.4	(5)

SECTION	SUBJECT	PERCENTAGE	
4	Glaciers	6.7	(3)
5	Hydrography (Potamography and Limnology)	2.8	(5)
6	Oceanography	3.7	(3)
7	Meteorology and Climatology. Terrestrial Magnetism	3.7	(3)
8	Biological Geography	0.9	(1)
9	Anthropology and Ethnography	3.7	(3)
10	Economic and Social Geography	3.7	(7)
11	Explorations	25.2	(57)
[12]	Systematic Regional Geography	11.2	—

A twelfth section has been added to the original eleven sections of Colonel Close's classification, viz.: systematic regional geography [*Länderkunde*]. (It is illuminating to note in connection with the validity as a criterion of the classificaton adopted by geographical congresses, to be discussed later, that this, the ultimate goal of modern scientific geography, is not represented in Colonel Close's list). From the above table it is obvious that travel and exploration hold much less commanding a position in the work of the Berlin society than they do in that of the Royal Geographical Society.

The difference is even more marked when we classify these papers according to whether they were presented originally as addresses at the meetings of the society or as direct contributions to its journal. A separate calculation of the percentages for each group resulted in the following table:

DIVISION OF ABOVE PAPERS INTO ADDRESSES AND DIRECT CONTRIBUTIONS

SECTION	ADDRESSES	DIRECT CONTRIBUTIONS
1	4%	19.3%
2	22	16.0
3	2	12.3
4	2	10.5
5	4	1.7
6	4	3.5
7	0	7.0
8	0	1.7
9	2	5.2
10	6	1.7
11	40	12.3
[12]	14	8.8

We see from these figures that in the addresses the percentage of explorations exceeds that of the other groups almost, though not quite, as much as it does in Colonel Close's list, while the direct contributions show a much more even distribution of the individual subject. We shall later inquire into the meaning of this difference; suffice it now to state the fact.

In order to obtain a broader basis for the conclusions which might be derived from these figures, I collected additional material from leading geographical periodicals of Germany, France and the United States. Instead of computing, however, the contents of five years of one journal, I took one year each of five journals whose scientific standard is universally recognized: *Petermanns Mitteilungen, Geographische Zeitschrift, Annales de Géographie, La Géographie, Bulletin of the American Geographical Society.* The respective figures, arranged in accordance with Colonel Close's scheme, are as follows:

CLASSIFICATION OF ORIGINAL PAPERS IN ONE YEAR EACH OF FIVE GEOGRAPHICAL PERIODICALS.

SUBJECT.	*Petermanns Mitteilungen.*		*Geographische Zeitschrift.*		*Annales de Géographie.*	
	NUMBER OF PAPERS.	PER-CENTAGE.	NUMBER OF PAPERS.	PER-CENTAGE.	NUMBER OF PAPERS.	PER-CENTAGE.
Mathematical and Cartographical Geography	7	17.0	3	9.0	2	10.5
General Physical Geography	5	11.9	5	15.1	6	31.5
Vulcanology and Seismology	1	2.4	2	6.0	0	0.0
Glaciers	0	0.0	4	12.1	4	21.0
Hydrography (Potamography and Limnology)	2	4.8	1	3.0	2	10.5
Oceanography	0	0.0	0	0.0	0	0.0
Meteorology and Climatology. Terrestrial Magnetism	0	0.0	5	15.1	1	5.2
Biological Geography	3	7.0	1	3.0	0	0.0
Anthropology and Ethnography	4	9.4	0	0.0	1	5.2
Economic and Social Geography	7	17.0	5	15.1	2	10.5
Explorations	11	26.1	2	6.0	0	0.0
Systematic Regional Geography	2	4.8	5	15.1	1	5.2
Totals	42		33		19	

SUBJECT.	*La Géographie.*		*Bull. Amer. Geogr. Soc.*		TOTAL NUMBER OF PAPERS.	AVERAGE PERCENTAGE.
	NUMBER OF PAPERS.	PER-CENTAGE.	NUMBER OF PAPERS.	PER-CENTAGE.		
Mathematical and Cartographical Geography	3	9.7	3	7.0	18	10.6
General Physical Geography	5	16.1	7	16.3	28	16.6
Vulcanology and Seismology	1	3.2	1	2.3	5	3.0
Glaciers	0	0.0	3	7.0	11	6.5
Hydrography (Potamography and Limnology)	2	6.4	0	0.0	7	4.5
Oceanography	0	0.0	1	2.3	1	0.6
Meteorology and Climatology. Terrestrial Magnetism	0	0.0	0	0.0	6	3.5
Biological Geography	2	6.4	0	0.0	6	3.5
Anthropology and Ethnography	2	6.4	6	14.0	13	7.7
Economic and Social Geography	4	12.9	11	25.8	20	17.2
Explorations	7	22.6	10	23.2	30	18.0
Systematic Regional Geography	5	16.1	1	2.3	14	8.3
Totals	31		43		168	

"The main conclusion" here, too, "is obvious enough": for the leading geographical periodicals of Germany, France and the United States, geography is *not* mainly an affair of exploration and surveys, although the list includes the classical organ of the great explorers of the second half of the nineteenth century, *Petermanns Mitteilungen*. Explorations alone account for no more than 18 per cent. of their contents on the average, with a maximum of but 26 per cent. The next largest sections are: economic and social geography, with an average of 17.2 per cent. and a maximum of 25.8 per cent.; general physical geography, with an average of 16.6 per cent. and a maximum of 31.5 per cent.; and anthropology and ethnography, with an average of 7.7 per cent. and a maximum of 14.0 per cent. In other words, mathematical and cartographical geography, general physical geography, anthropology and ethnography, economic and social geography, explorations and systematic regional geography account for 78 per cent. of the contents of these five periodicals, allowing no more than 22 per cent. for the six remaining sections combined.

There is still another test which ought not to be omitted in determining the character of geography as a science: it is the place which it occupies as a subject in the curricula of the universities. The number of courses and of hours assigned to each of the above-mentioned sections will clearly indicate what geography is considered to be by the geographers themselves who claim to be scientists and what importance they attribute to the respective sections. Unfortunately, I have only been able to obtain the announcements of the courses given in German in the universities of Germany, Switzerland and Austria. But, inasmuch as these figures are used only to supplement those above, not for independent conclusions, and as Germany has been the classical country of scientific geography from its very beginnings, this one example may be considered adequate. There were announced for the winter semester of 1911-12 a total of 91 courses in geography, amounting together to 220 hours a week*.

The following table represents the proportion of courses and time devoted to the respective sections:

ANALYSIS, ACCORDING TO SUBJECT, OF GEOGRAPHICAL COURSES OFFERED IN GERMAN IN THE UNIVERSITIES OF GERMANY, AUSTRIA AND SWITZERLAND DURING THE WINTER SEMESTER OF 1911-12.

SUBJECT	COURSES	TIME
Mathematical and Cartographical Geography............	14.4%	10.0%
General Physical Geography	17.7	25.0
Vulcanology and Seismology	0.5	0.2
Glaciers	4.4	2.7
Hydrography (Potamography and Limnology)...........	0.0	0.0
Oceanography	3.3	4.1

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* The actual number of hours and courses is even larger because the "colloquia" and "Übungen," the hours and subjects of which are announced later in the year, could not be included for this reason.

SUBJECT	COURSES	TIME
Meteorology and Climatology; Terrestrial Magnetism....	1.1%	0.9%
Biological Geography	2.2	2.2
Anthropology and Ethnography	7.7	7.7
Economic and Social Geography	12.4	9.5
Explorations	4.4	4.5
Systematic Regional Geography	32.2	33.2

According to these figures, the men who, in Germany, consider geography a science are so far from identifying its contents with exploration and mapping that they assign to these two sections but 18.8 per cent. of their courses and 14.5 per cent. of their time, while to systematic regional geography and general physical geography together, they assign 50 per cent. of their courses and 58 per cent. of their time. To the latter two subjects, in conjunction with anthropo-ethnological and social-economic geography, they devote 70 per cent. of their courses and 75 per cent. of their time, leaving but 12 per cent. of the courses and 10 per cent. of the time to the work of the six remaining sections combined.

It cannot be denied that Colonel Close's estimate of geography differs considerably from that of Continental and American geographers. If in spite of the facts given here he could arrive at the conclusions expressed in his address, the discrepancy must be due to his method of inquiry, and it is his method which we must now examine.

In his evaluation of the purpose and position of geography he was guided by a laudable desire to be impartial. For this reason he refrained from establishing any personal standard of merit and adopted instead what he believed to be the accepted standard of geographers themselves. This policy might have supplied him, indeed, with an excellent foundation if he had not been strangely unfortunate in the choice of his standard. In supposing the classification of the Geneva Congress to represent the various aspects of geography and their relative importance, he overlooked the fact that the programs of international congresses are not arranged for the purpose of establishing ideal classifications of the various branches of knowledge, but rather to furnish a working basis for scientists from all countries in order to establish an international understanding about the work pursued or to be pursued, with special reference to the problems under consideration. It is evident that the schedule of the work of these congresses must vary from one meeting to the other, both in its purpose and content, and that no two such schedules will be alike, as, for instance, reference to the reports of the three last congresses, those of Berlin, of the United States and of Geneva, and to the prospectus of the coming congress at Rome, will show. Moreover, a closer examination of the titles of the papers offered at the various international congresses or of the past volumes of the leading scientific periodicals for any one period discloses another characteristic fact. It is that each congress as well as each periodical has a field of its own, as it were, and that, although striving to do justice to the whole subject as much as possible, there is, in the congresses, a law of historical evolution, and in the periodicals, one of division of labor, which gives to each of them a stamp of its own. At the early international geographical congresses, for instance, the interest in the great discoveries of the times was paramount, but, beginning with that of Berlin, a transition made itself felt which influenced the program to the effect that more time was given to the sifting and examining of the material at hand, and the scholarly side of the science came more and more to the front. Among the periodicals there are some especially favored by explorers for the publication of their original reports, such as *Petermanns Mitteilungen* and the *Geographical Journal.* Others specialize more in economic and social geography, still others in the anthropological and ethnological sides of the subject, and another group prefers to furnish a common meeting ground for the devotees of general physical geography. This is a great advantage, because in our era of specialization no working scientist can keep up with the literature of his entire subject, and he must know where to look first for contributions to his own specialty. But it is obvious that under these conditions statistics founded on the contents of one periodical only cannot but lead to erroneous conclusions, and for this reason I have chosen, not five years of one periodical, but one year each of five, in order to obtain a picture of the actual state of things.

In spite of the essential differences which exist between Colonel Close's tables and my own, there is a partial resemblance between the two groups which ought not to pass unnoticed. It is the conspicuous drop of the figures in Sections 3 to 7 (vulcanology and seismology; glaciers; hydrography, potamography and limnology; oceanography; meteorology and climatology; terrestrial magnetism), and sometimes in Section 8 (biological geography), which proves that these sections are not coordinate with Sections 1, 2, 9, 10, 11, 12 (mathematical and cartographical geography; general physical geography; anthropology and ethnography; economic and social geography; explorations; systematic regional geography). This fact is further proven by the programs of the other international congresses in which the former subjects do not appear as independent sections. This is not doing them injustice, for, however expedient their separate treatment may be, for reasons of practical convenience, they do not cease therefore to be *subdivisions of general geography,* and every paper offered in any one of these sections could with equal propriety have been listed under one of the principal divisions of general physical geography: air, ocean, land.

Colonel Close's criticism of the inclusion of these subjects in geography as indicative of the lack of unity of geography as a science seems peculiarly unappreciative of the close relationship of all branches of modern science. What science is there, with the possible exception of mathematics, that is not nowadays interrelated with one or several other sciences? The times when every branch of knowledge had its territory precisely limited are gone never to return. Those were the times when the contents of the so-called descriptive sciences were lists of names, when the man who knew most plants was the greatest botanist and he who knew the names of the largest number of animals, the greatest zoölogist. In those times the best geographer, too, was he who had the largest number of towns, capes, mountains, rivers, at the tips of his fingers. But modern thought has revolutionized the methods of study and with them the contents of the sciences themselves. In proportion as the scientific spirit spreads specialization increases. Organic and inorganic chemistry, for instance, have almost become separate sciences. In a similar way the scientific pursuit of geography has resulted in the growth of special branches, of which geology itself was the first, with all the other "ologies" following in their turn. Of course, geography remains the "common meeting ground" for the daughter sciences, because it is their mother earth from which they must not depart under penalty of losing the large points of view without which all special work remains fragmentary.

The close relationship of geography to other sciences is further evidenced by the early careers of many prominent geographers. It is a fact that more than one of the leading men in our science, especially among the older generation, was a specialist in some other branch before becoming a geographer. The reason for this was not the non-existence of geography as a science, but the fact that at the time when these men entered upon their scientific work, geography was not yet recognized as such, nor taught at the universities at all. They made their start in science by means of the subjects which were then included in the courses of study; but while their fellow scholars, who were born geologists or biologists or historians, remained faithful to the subjects of their first choice, those who were born geographers proceeded into the region of the unknown and *created* what we now recognize as scientific geography. It goes without saying that the character of the previous studies of those pioneers predetermined to a certain degree what part of geography each would be most fit to originate; those hailing from geology developed the physiographic aspects, those in command of historical or biological methods, the ontographic aspects of the subject. From the moment they had entered upon this work, however, they ceased to be geologists or biologists or historians and became geographers. The geographers of the present generation who began work under their guidance and found geography ready to be taught at the universities were geographers from their very beginnings and were obliged to prove their claim of being scientists by *geographical research.* Their special inclinations and gifts, of course, lead them to choose sometimes one, sometimes another, department of the subject for their special work, and accordingly to combine their studies with mathematics, or geology, or economy, or biology. This is as little a reason for calling them mathematicians, or geologists, or economists, or biologists, as the fact that a sociologist chooses history for his minor subject makes that man a historian. A scientific book on geology will have to refer to physics, chemistry, zoölogy, in ever so many places, and it is not the geologist, but the physicist, chemist, zoölogist, who did the original work on which the geological structure rests; the geologist only uses the results of these fellow scholars as tools for his own work. Yet nobody has ever charged geology with being a *compilation* of physical, chemical, zoölogical matter borrowed from various sources! Why should geography alone, under the same circumstances, be accused of being nothing but a compilation of other sciences?

Moreover, not only are all branches of modern science closely related, but the center of interest in any one science is subject to change periodically and locally. There was a time in zoölogy when invertebrate embryology was the chief claimant of attention, as in our days determination of sex, eugenics and similar problems seem to take the lead. So in geography there was a time when exploration and mapping stood in the foreground. It was the time when, after Humboldt and Ritter had built up their imposing constructions of the earth and its inhabitants, geographers with a modern scientific turn of mind noticed on what imperfect foundations the superstructures were built and realized that the most imperative need for a geography that would be scientific was a more exact knowledge of its object, the earth itself. The name of August Petermann embodies that period. It was the era of the great modern discoveries and the era, too, of the foundation of the great geographical societies whose main purpose was *not* to cultivate pure science, but to interest the public at large in questions of discovery and exploration. For the explorers needed funds to carry out their expeditions, and the means of the societies would increase in proportion to their membership. In the scientific part of the geographical world this rather sensational interest in the subject has now given way to a more scholarly understanding of it, and this changed attitude is reflected in the above mentioned change in the character of the international congresses. Only in the popular conception of geography does exploration still occupy the first place among its various branches.

The fact alone that Colonel Close takes the activities of a geographical society as his main standard for determining the scientific character of geography proves how far he is from appreciating the actual situation. Otherwise he would not place a geographical society, however leading among its class, on a level with mathematical, astronomical, geological and similar societies. The latter are associations of specialists, founded to keep the devotees of their respective sciences in touch with each other and thereby to promote scientific progress. No persons are admitted to membership unless they are doing original work or hold a position which is in itself a guarantee of the scholarship of its occupant, even though he might not be a fecund writer. The proceedings or journals of these societies are the organs for the publication of the work of their members, and their contents are, as a rule, unintelligible to the general public. In the geographical societies, as has been shown above, scholarly interests are but indirectly represented; their size alone proves what a large percentage of non-geographers they include. Of course geographers belong to them as well; they even do most of the work. But in their addresses they must adapt their subjects to the character of their audiences, the majority of which are lay hearers, and therefore most of them prefer to read their purely scientific papers at the meetings of strictly scientific societies.* There is only one such association, to my knowledge, which is a truly scientific geographical society of equal standing with mathematical or geological societies because its membership is limited to professional geographers: The Association of American Geographers. Unfortunately this association has only recently resolved to publish a journal of its own; it is to that journal that we may look some day as an authentic criterion of the scope of geography as a science. But the typical geographical society, whether subsidized by a government or maintained as a private corporation, is not a clear source from which to obtain such information; in its work exploration will always occupy a space quite disproportionate to its rôle in scientific geography, because exploration is that part of geography which appeals most strongly to general and popular audiences. This must in no way be construed as a reproach to geographical societies; they are fulfilling a very useful mission and have certainly done more, in their way, for the general education of the public than strictly scientific societies ever can expect to do; but this is not a reason for selecting their work as the basis for a definition of the scientific character and value of the subject.

The real character and content of scientific geography has been defined so often and so completely by its leading representatives in all countries where it is pursued that anyone not conversant with it need but consult their works in order to familiarize himself with its nature. While differing on minor points they all agree that, in spite of the complexity of the subject, the unifying element is given in the object of study: the surface of the earth, as a whole and in its parts, studied either from the systematic or from the monographic, or regional, point of view. Just as, in zoölogy, an author may write either on general problems (such as the operation of Mendel's Laws), or on questions of systematic importance (such as the question whether *Limulus* belongs to the crustaceans or to the spiders), or may write a monograph on some species (cf. Leuckart's work on *Trichina*), so in geography one may investigate either problems of general geography (such as the location and distribution of volcanoes), or systematic problems (such as the determination of the type, whether fiord or *ria,* to which the Maine coast belongs), or the *ensemble* of a special geographical region (as exemplified by Ratzel's monograph on the United States). There is no reason why the first three problems should be considered scientific while the latter three should not—unless they were treated in an unscientific way, in which case both groups would be equally open to criticism. But what is it that, admitting the constantly increasing complexity of the sciences, determines the special scientific character of any problem, since quite a number of problems may with equal right be classed with several sciences and treated in various text-books? In answering this question we shall never err far from the truth when we remember Professor Davis's principle that "it is the relation into which the object enters that determines its place." When we find zoölogical, geological, economic discussions overlapping upon geographical ground, or vice versa, we know that the subject belongs to geography as soon as it is presented in one of the relations which we claim as purely geographical. *Such relations,* on which all geographers of note agree, *are location and distribution as stimulus of, or response to, existing conditions on the earth's surface,* and they apply to both inorganic and organic bodies. Thus the drowning of the river valleys of New England is a geological fact and the settlement of New England a historical one; but the fact that the harbors formed by the drowned valleys afforded protection to the settlers and that for this reason the original settlements grew up at the heads of these bays, belongs to geography, for it expresses the influence of location on a phenomenon associated with that section of the earth's surface, or the natural law which controls the occurrence of that phenomenon. The person who first establishes such a law and follows its application all over the inhabited part of the globe is *not* compiling geology and history, but is doing "original, definite, and quantitative research" in *geography.*

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* This fact easily explains why, in the work of the Berlin Geographical Society, the percentage of papers on exploration is so much larger among the addresses than among the contributions directly furnished to its journal.

One word more on the subject of distribution. It is true that distribution alone does not constitute geography, and in this respect the explanation given by Professor de Martonne and quoted by Colonel Close is not quite satisfactory. The mere fact that the botanist "seeks to determine its [the plant's] area of extension" does not transform the investigation from a botanical to a geographical one. I cannot do better than again to quote Professor Davis* on this matter when he says that, if geography is so understood, then the distribution of anything might be fit for geographical study. Moreover, such distributional treatment "is apt to take up *one kind* of thing at a time and follow it wherever it is found, thus failing to give account of the natural occurrence of many kinds of things in their actual association which geography demands." Similarly, a map showing the distribution of any chosen specimen or phenomenon is not for the sole element of distribution a geographical map, but remains a part of the science to which its subject belongs.

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* Geographical Essays, No. 1.

What then constitutes the geographical element in distribution? This question, too, has been answered before. Says Professor Herbertson of Oxford*: "The recognition of geographical forms has gradually been taking place. It has necessarily been late in the history of thought, first, because our knowledge of the surface of the globe was insufficient until the explorations of the nineteenth century had traced its fundamental features; and, second, because the specialist interpretation of the accumulated data was a necessary preliminary to its utilization for systematic geography.

". . .A period of intense analytical specialization was a necessary preliminary to the more complete synthesis.... Speaking generally, this synthetic work must have been carried far enough to permit of at least rough mapping before the geographer can begin his part of the task. In Berghaus's Physical Atlas, and for meteorology in Bartholomew's volume, we have the raw material for systematic geography. These maps, however, unless it be in the case of configuration, are not drawn from the geographical point of view, but from those of the various specialists who have edited the volumes.

"In what way is the geographer to use this raw material in working out a systematic geography? This involves the question, what is the subject-matter of geography? This I take to be the study of phenomena from the point of view of their distribution on the surface of the earth, *in natural groups, and not as isolated phenomena*.†

"Geography is not concerned with [the] distribution of one element on the earth's surface, but with all. If geographers first regard the distribution of different phenomena separately, it is only in order to help them later to consider them together more effectively. This is not to say that all these different distributions are of equal importance, but that all must be taken into consideration before the problem of systematic geography is solved.... Configuration is necessarily the framework, but we must not think of it merely as a more or less irregular surface; we must see it as part of a solid which comprises not merely the soil beneath, but the air above, with relations to other parts of the earth and also to the influences coming from outside the earth. This gives a movement, a life to the whole, and it seems to me useful and not altogether fanciful to speak of this geographically discerned complex as a macro-organism."

And, in a presidential address to the British Association, Professor Herbertson said: "I wish to lay great stress on the significance of vegetation to the geographer for the purposes of regional classification. I do not wish to employ a biological terminology nor to raise false analogies between the individual organism and the larger units of which it is a part, but I think we should do well to consider what may be called the life or movement going on in our units as well as their form . . . . By vegetation I mean not the flora, the historically related elements, but the vegetable coating, the space related elements. Vegetation in this sense is a geographical phenomenon of fundamental importance. It indicates quality—quality of atmosphere and quality of soil. It is a visible synthesis of the climatic and edaphic elements. Hence the vast lowlands of relatively uniform land features are property divided into regions according to vegetation—tundra, pine forest, deciduous forest, warm evergreen forest, steppe, and scrub. Such differences of vegetation are full of [geographical] significance."

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* "The Major Natural Regions," *Geogr. Journ.*, Vol. 25, 1905, No. 3, p. 301.

† The italics are mine. M. K. G.

Similarly, a map showing the distribution of limestone soils is a geological map, but a map which shows how in the limestone country human habitations are gathered into compact villages around one or more deep wells, while in the bottom lands they spread comfortably along the river, is a geographical map, and what is true of the map is true also of the written word. The ripest product of truly geographic scholarship is therefore the geographical monograph devoted to the study of an individual geographical region, the type of work so well represented in modern French and German geographical literature, and of which England possesses the classical example in Huxley's Thames. If he has not yet found more disciples in this field in England the cause probably is that the Empire has been too busy exploring, surveying and mapping its large territories. But in proportion as the English universities pay more attention to the long-neglected subject of geography, it is to be hoped that this phase of geographical research will be better appreciated by all who are called upon to utter an opinion on this subject.

Further Comment

(Extract from "Prof. Hellmann on the Floods of the Oder" [a review] by Hugh Robert Mill, D. Sc., *Geographical Journal,* Vol. 38, No. 6, 1911, pp. 601-602.)

Colonel Close, in his recent address as president of Section E of the British Association, called attention to "the extremely frank way in which vulcanology, seismology, meteorology, climatology, terrestrial magnetism, anthropology, and ethnography are included in geography." He went on to say that the papers "on meteorology and climatology" which had been read before the Royal Geographical Society during the last five years might have been read with perfect appropriateness before the Meteorological Society and made the suggestion that the authors who send such papers to the *Geographical Journal,* instead of sending them to the *Journal of the Royal Meteorological Society,* "in so doing appeal rather to the public at large than to men of their own special sciences." If this opinion be accepted, it places a geographer who is asked to review a meteorological work for a geographical society in a somewhat awkward position; for it would follow that such a work must be presented to the readers of their journals not as geographers, but as members of the public at large. I, on the other hand, hold so different a view of the relation to geography of the sciences referred to, and of geography itself, that in writing as a geographer for geographers, I feel that I must vindicate my position before taking up the subject of this review.

In the article "Geography" in the Encyclopædia Britannica, 11th edition, I said: "Geography is a synthetic science dependent for the data with which it deals on the results of specialized sciences, such as astronomy, geology, oceanography, meteorology, biology, and anthropology, as well as on topographical description. The physical and natural sciences are concerned in geography only as far as they deal with the forms of the earth's surface, or as regards the distribution of phenomena. The distinctive task of geography as a science is to investigate the control exercised by the crust-forms directly or indirectly upon the various mobile distributions. This gives to it unity and definiteness, and renders superfluous the attempts that have been made from time to time to define the limits which divide geography from geology on the one hand and from history on the other."

If this view of geography is kept in mind a paper on the distribution of rainfall would be seen to be more appropriate to a geographical than to a meteorological journal, because the distribution is conditioned by the relation of land and sea, the tracks pursued by atmospheric depressions, and the configuration of the land. A paper on the formation of rain would, of course, be more appropriate to a meteorological than a geographical publication, because it deals with the non-geographical part of the subject. In general, I consider that no discussion of the distribution of anything is foreign to geography, although the thing in other than its distributional aspect may be the subject-matter of another science. If Colonel Close is right I am wrong in my point of view, and the Editor of the *Geographical Journal* is wrong in inserting this notice, for it is not directed to the public at large, but to those trained in geography, or at least so far interested in geography as to have an interest in it greater than that of the casual reader.

GEOLOGIC MAP OF NORTH AMERICA*
A REVIEW

BY

E. C. CASE

AND

W. L. G. JOERG

It is with much pleasure that one welcomes this map, which is a revision, on the same scale, of the map issued at the Tenth International Geological Congress which met in the City of Mexico in 1906, and it is with increased pleasure that one considers the minute care and skilful workmanship which has gone into its preparation. An increased brilliancy of colors makes it less pleasing in general effect at the first glance than the original, but one soon forgets this in appreciation of the increased clarity of the boundaries accomplished by the change. Perhaps only in one or two cases is there any lack of contrast in the different areas. The Middle and Upper Ordovician (No. 17) is not easily distinguished in some cases, notably where it is next to or surrounded by the Pennsylvanian (No. 12), as in west central Arkansas.† The addition of small numerals inserted to aid in the identification of formations is also a valuable innovation.

Turning naturally to Alaska to see what has been accomplished in that Territory we are struck by the fact that some parts which were filled in on the first map have been left bare or have been considerably revised. The region around Point Barrow is now left bare, and the country between the Noatak and the Selawik Rivers is now mapped only in the immediate valleys of the Kobuk and the Selawik Rivers. The portion of the Alaska Peninsula marked Jura-Trias on the older map is now shown as Marine Jura, and the area mapped is confined to the eastern end of the peninsula. The lower portion of the valley of the Koyukuk River is given only as Lower Cretaceous, and the portion of the valley of the Yukon below the mouth of the Koyukuk and the region northwest of this to the coast is marked Upper Cretaceous. Between the Matanuska and the Susitna Rivers a considerable area is left blank, and along the upper portion of the Tanana River there is a change from metamorphosed Paleozoic sediments and intruded pre-Cambrian igneous to metamorphosed pre-Cambrian with supposed Paleozoic and Mesozoic and post-Cambrian intrusives. The great area along the border line between the Yukon and the Mackenzie Territories left blank in the earlier map is now filled in with the same formation as lies to the west, metamorphosed Paleozoic sediments.

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* GEOLOGIC MAP OF NORTH AMERICA. Compiled by the United States Geological Survey in cooperation with the Geological Survey of Canada and Instituto Geologico de Mexico, under the supervision of Bailey Willis and Geo. W. Stose. Scale, 1:5,000,000. Pl. I. *U. S. Geol. Survey*, *Prof. Paper* 71, 1911. Also sold separately: price, 75 cents.

† This indistinctness is due to a fault in the color plate. In other regions where the Pennsylvanian and the Ordovician adjoin, as, for instance, in northern Illinois, the colors are readily distinguishable.—ASST. ED.

Turning towards the central portion of Canada and the northeast quarter of the map we note very few changes in the mapping of the Canadian Shield or the Arctic Archipelago. The map of Greenland is greatly improved by the more complete sketching in of the glaciers. Pre-Cambrian intrusives are now shown on the southern end of Greenland and for some distance up the southern end of the eastern side. The coast beyond Cape Brewster is mapped in considerable detail, Jurassic, Triassic and Devonian being shown; the extreme northeastern part of the coast is still left blank.

Newfoundland, Prince Edward Island and New Brunswick are left practically unchanged. In the vicinity of Moosehead Lake there are a few changes consisting mostly in the extension of the Cambrian and the inclusion of a strip of Ordovician in a northeast-southwest direction across Moosehead Lake.

In the portion of Canada north of New York and Vermont there are several changes in the valley of the St. Lawrence River and in the region to the east, notably the subdivision of the part previously marked Cambrian into Cambrian-Ordovician and Ordovician.

In the southeast quarter of the map the chief changes are in the mapping of the Piedmont Plateau and the Atlantic Coastal Plain. The outlines of the Newark formation are changed somewhat in the former, but the chief changes are those in the regions marked pre-Cambrian and metamorphosed Paleozoic sediments in the old map, which are now referred in large measure to pre- and post-Cambrian intrusives, and the inclusion of some Cambrian and lower Ordovician in Virginia as well as in North and South Carolina. The area of Lower Cretaceous in North Carolina is greatly limited by the mapping of larger areas of pre- and post-Cambrian intrusives. The coastal plain of North Carolina and the northern portion of South Carolina is changed by the increase in the area of the Lower Cretaceous and the limitation of the Miocene. On the coast from the central portion of New Jersey to Florida there is mapped a strip of Quaternary of greater or less width. This is extended around the borders of the Gulf Coastal Plain and includes most of the southern half of Florida. Notable also is the inclusion of a strip of marine Oligocene which appears in South Carolina and, taking in the northern half of Florida, extends around the whole of the Gulf Coastal Plain. The Eocene of the Coastal Plain is less changed. It is somewhat limited in area in Georgia, and a strip is included in the Mississippi Embayment on the west side of the Mississippi River, extending as far south as Helena in Arkansas. In the same region the Cretaceous is carried around the north end of the Eocene so that it reaches as far north as Cairo.

The mapping of the Appalachian mountain region is only changed in minor details. The same may be said of most of the northern part of the Mississippi Valley. In Minnesota a large area previously marked as Eo-Algonkian and pre-Cambrian is now considered as Upper Huronian. A large area of pre-Cambrian is recognized along the course of the Red River of the North in North Dakota, and the area along the course of the Minnesota River is increased. The Sioux Quartzite is reduced in area in Minnesota.

Returning to the south we find that in Cuba Upper Cretaceous, Triassic and Jurassic are substituted for pre-Cambrian in the western end and post-Cambrian intrusives for pre-Cambrian igneous in the eastern part. There is little change on the eastern side of Mexico, beyond the separation of the extremity of the peninsula of Yucatan as Pliocene from the bulk of the peninsula, which is reckoned as early Tertiary. On the western side of Mexico the peninsula of Lower California is altered by the continuing of the post-Cambrian intrusives down the center as far as Cabo Virgenes and Punta Abrojos. The lower end is marked as Upper Cretaceous. In the north central portion of Mexico the Tertiary and later effusives are limited by the extension of the Quaternary and the mapping of a considerable number of isolated areas of lower Cretaceous.

The western portion of the United States, shown in the south-west quarter of the map, has, as is to be expected, many changes. The blank in the southwestern part of Texas is filled in by the mapping of Tertiary and later effusives and by a small area of Ordovician and Permian. The great blank in central New Mexico is filled in largely with undifferentiated Carboniferous, and the Triassic is carried down the eastern side of the Pecos valley as far as Roswell. The blank in the southern parts of Arizona and California is filled in with Quaternary and isolated masses of pre-Cambrian and, in southeastern Arizona, isolated masses of Paleozoic. The blank in northeastern Arizona and southeastern Utah is filled with Jura-Trias, with a small center of upper Cretaceous. The adjacent portions of Colorado, Utah and Wyoming around the Uinta Mountains is marked as covered by continental Eocene, as is the region in northwestern New Mexico at the head of the San Juan River; both of these were formerly marked as Eocene, but the true nature of the deposits was not indicated.

There are numerous changes in the mapping of details in the front ranges of the Rocky Mountains, but they can hardly be described in a limited review. The valley of the South Platte around Greeley and Denver is still marked as Laramie. The portion of South Dakota including the Big Bad Lands and the valley of the North Platte in western Nebraska and eastern Wyoming are mapped as continental Oligocene. A great area in western North Dakota, northwestern South Dakota, eastern Wyoming and Montana formerly called Laramie is now marked as continental Eocene with a fringe of doubtful Laramie or basal Eocene.

The great expanse of Cretaceous marked on the earlier map in northern Montana is further broken by the introduction of the uplifts of the Big Snowy Mountains and similar smaller areas just east of the Little Belt Mountains. West of the Little Belt Mountains the Belt Terrane occupies a wide strip running north nearly to latitude 52° N. and replacing the metamorphosed Paleozoic rocks of the earlier map. In northern Montana there is a detailed mapping of the Montana coal bearing formation; this is continued into Alberta and Saskatchewan as far north as the Saskatchewan River.

In the northwestern part of the State of Washington the effusive igneous rocks near the coast are changed to Marine Jurassic. The great blank in southern Idaho and Nevada and northwestern Utah is filled with Tertiary effusives and Quaternary. The blank on the coast of northern California is filled by the mapping of Jurassic rocks, and the central portion of the Klamath Mountains is recognized as Paleozoic instead of pre-Cambrian. E. C. C.

In addition to the above appreciation of the geologic subject-matter of the new Geologic Map of North America a few words regarding its cartographic and geographic aspects may not be out of place.

The polyconic projection used on the map of 1906 has been retained for the new edition, in spite of intervening valid adverse criticism of its appropriateness*. The system of coordinates, however, has been changed on the present edition, the parallels being drawn at an interval of 4° and the meridians of 6°. They have been made to coincide with the limits of the sheets of the International Map of the World, 1:1,000,000. The letters and numerals adopted to designate the sheets of that map have been added in red along the border of the continent and on the edge of the map. On land the meridians and parallels have been drawn for every degree. The marking of every second degree, both of latitude and of longitude, not only on the edge of the map as a whole, but on the border of each individual sheet, is also a valuable innovation. Localizing is further greatly facilitated by the far more copious topologic nomenclature.

The geologic color scheme is more detailed in the new edition than it is in the old. Forty-two separate symbols are shown on the former instead of twenty-five on the latter. The grouping of the symbols in the legend is far more synoptical, as distinction is made between the symbol used for a group of undifferentiated formations and the subdivisions of the same group, as, for instance, undifferentiated Carboniferous, on the one hand, and, on the other, Permian, Pennsylvanian, Mississippian. The color sequence again follows the prismatic system in general: the greatest noticeable difference being in the change of the tone representing the Ordovician from pink on the previous edition to gray on the new. A valuable innovation is the addition, on the border of each sheet, of all formational symbols used on that sheet, thus doing away with the necessity of consulting the sheet which contains the legend.

As a product of the printer's art the map is of the best. That supreme test of accurate map reproduction, the proper superimposition of colors, is most successfully met. The forty-two colors of the map, which necessitated fourteen separate printings, register perfectly. The language of the Geological Survey *Press Bulletin* is modest, indeed: "It is believed that there are few if any other establishments in the United States capable of turning out such a production."

With regard to the geographic content of the map, attention must be called to the fact that the quality of the geologic mapping represented is not of uniform value for all regions. Thus, while the formational boundaries and designations are practically correct for the United States and southern Canada, the mapping of the northern parts of Canada is of a very general nature. In this it reflects the character of the standard Geological Map of Canada, 1:3,168,000, 1901, which has probably in part been used as a source. The designation, on the present edition, of the Mackenzie Mts. (forming the divide between the upper system of the Yukon and the Mackenzie), for instance, as belonging to the Paleozoic system, although they were left blank in the edition of 1906, is based alone on reconnaissance surveys, viz., those of Keele and Camsell.† The seemingly less comprehensive delineation of the geology of Alaska, as compared with that on the edition of 1906, referred to in Professor Case's review, is due to the fact that, for this region, only areas actually surveyed have been included on the present edition.

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* Cf. Kartenkunde, by E. Gelcich, F. Sauter, and P. Dinse, 3rd edition, revised by M. Groll, Leipzig, 1909, p. 104.

† Cf. *Annual Report*, Geol. Survey, Canada, Vol. 16, 1904, sub-reports C and CC; and Publ. No. 1097, Geol. Survey, Canada, 1910; also *Bull. Amer. Geogr. Soc.*, Vol. 42, 1910, pp. 176 and 779–780.

The greatest blemish on the map, from the geographic point of view, is its total ignorance of the results of the Mylius Erichsen Expedition of 1907-08. The absence of the characteristic Northeast Foreland of Greenland on a map bearing date of 1911 is a *lacuna* indeed, which, in this case, is emphasized all the more by the relatively large scale of the map. The inclusion of the geology of regions not belonging to North America, such as Iceland, northern Colombia and northwestern Venezuela shows that it is the intention of the compilers to portray the entire area enclosed within the borders of the map and renders difficult the validity of an excuse for the above omission. The non-inclusion of Hansen's survey of the King Haakon VII Coast of Victoria Island is further evidence of unfamiliarity with recent explorations—a condition unfortunately already apparent on the edition of 1906, which failed to show the result of Amdrup's survey in 1898-1900 of the coast of King Christian IX Land of Greenland (34°–25° W.). It is only fair to state that this omission has been rectified on the present edition.

These criticisms, however, must in no way be allowed to obscure the fact that the new edition of the Geologic Map of North America is the unquestioned standard in its field. It is indeed fortunate for us, with our dearth of private map-publishing houses doing constructive work of a scientific nature, that such institutions as the Geological Survey do not conceive their work to be limited to the production of raw material, but extend their field of activity to synthesis and generalization. For this, geography—for are not these two qualities its very philosophy of life?—and especially American geography, should be extremely grateful.

W. L. G. J.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Meetings of the Society. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 West Thirty-ninth Street, on Tuesday evening, Nov. 21, 1911. Vice-President Greenough in the Chair. The following persons recommended by the Council were elected to Fellowship:

Miss Mura Bayly,
Eugene S. Benjamin,
Samuel S. Dennis,
H. Palmer Gallaher,
Lawrence Lewis Gillespie,
William J. Matheson,
Dr. Francisco P. Moreno,
George B. Shattuck,
John T. Terry, Jr.,
Theodore Dehon Wilson,
Edwin O. Wood,
C. Wickliffe Yulee.

The Chairman then introduced Prof. Charles E. Fay, recently President of the American Alpine Club, who addressed the Society on "The Majesty of the Mountain." A large number of stereopticon views were shown.

A meeting of the Society was also held at the same Hall on December 26,

1911. Vice-President Greenough in the Chair. On recommendation of the Council, the following persons were elected to Fellowship:

Lieut. Donald Armstrong,
Enoch Henry Currier,
William Hallock,
William Williams.

The Chairman then introduced Mr. Walter McClintock, who addressed the Society on "The Land of the Blackfeet." Mr. McClintock had lived among this tribe for two years. His illustrations included a few moving pictures showing small pack trains in camp or on the march, Blackfeet dances, etc.

NORTH AMERICA

PROF. PARKER'S NEXT ATTEMPT ON MT. MCKINLEY. Prof. Herschel C. Parker of Columbia University sailed from Seattle on Jan. 24 for Alaska to begin, from the town of Seward, a winter journey to Mt. McKinley, which he hopes to ascend. His companions are Belmore Brown of Tacoma, Arthur Aten of Valdez, Alaska and Merl La Voy, all of whom participated in his Mt. McKinley expedition of 1910. The party will start from Seward with dogs and sleds, follow the line of the Alaska Central R.R., and then the regular trail to the Susitna Station, about 22 miles above the mouth of the Susitna R. Beyond this point they will have to break their own trail.

The party will go up the Susitna R. on the ice to the Forks at Talkeetna, about 65 miles above Susitna Station. Here the Talkeetna R. comes in from the east and the Chulitna from the west. They will follow the latter towards its headwaters until they can find a pass over the Alaskan Range. If they succeed in crossing the Range they will be on the northeastern side of Mt. McKinley and will make their attempt on the mountain itself from that side.

Two sledges, drawn by Eskimo dogs in charge of Aten, will carry the outfit including provisions, the whole weighing about 2,000 pounds. The base camp will be pitched at the highest point that it is possible to take the whole outfit. A still higher camp will be made at the highest point where the dogs and sledges can be used, and here the animals and sleds will be left in charge of one member of the party until the return from the summit. Prof. Parker hopes to reach the mountain by March 15, and to attack the harder part of the climb by April 1.

OUR LARGEST OUTPUT OF PETROLEUM. The Advance Chapter on Petroleum from "Mineral Resources of the United States" for 1910 says that over 200,000,000 barrels of oil, valued at nearly $128,000,000 were produced in the United States in 1910. Our petroleum industry has been marked by phenomenal increase in recent years. It passed the 100,000,000-barrel mark in 1903, was over 170,000,000 barrels in 1904, fell to 135,000,000 barrels in 1905 and rose to 178,000,000 barrels in 1908, 183,000,000 barrels in 1909 and 209,556,048 barrels in 1910. The total output of our petroleum industry to this time is more than two billion barrels. The United States is now producing more than all the rest of the world together. California heads the list of producers in 1910 with 73,010,560 barrels. The second among the oil producing states in 1910 was Oklahoma with 52,028,718 barrels. The output of these two states is practically equal to the entire foreign production. The third largest producer was Illinois with 33,143,632 barrels. There are now 148,440 oil wells in operation in the country.

OUR IRON AND STEEL INDUSTRY IN 1910. The U. S. Geol. Survey *Press Bul-*

letin (New Series No. 24) reports that in 1910 the iron ore production of the United States was 56,889,734 long tons, the pig iron production 27,303,567 tons, and the steel production 26,094,919 tons. These figures surpass all previous records. The following table shows the enormous growth of the iron and steel industry in the United States since 1900:

	IRON ORE	PIG IRON	STEEL
1900...........	27,553,161	13,789,242	10,188,329
1905...........	42,526,133	22 992,380	20,023.947
1906...........	47,749,728	25,307,191	23,398,136
1907...........	51,720,619	25,781,361	23,362,594
1908...........	35,924.771	15.936,018	14,023,247
1909...........	51,155,437	25.795.471	23,955,021
1910...........	56,889.734	27,303,567	26,094.919

PROFESSORS TARR AND MARTIN IN ALASKA. It has been stated in the *Geographical Journal* for October, and in Associated Press despatches that a Smithsonian expedition for the study of glaciers had lost all the field notes and photographic results of the season's work. As a matter of fact it was a National Geographic Society expedition under the direction of Prof. R. S. Tarr of Cornell University and Prof. Lawrence Martin of the University of Wisconsin, two of the associate editors of the *Bulletin*. No photographic negatives were lost, though, most unfortunately, one of the note books containing Prof. Tarr's data on a month's work, the first of the season, was swept away. The upset of the conveyance took place not in the Yukon but in a glacial stream in the Delta River Pass across the Alaska Range. Word has just come of the recovery by some soldiers of a sack containing a camera, field glasses, railway tickets, etc., so that a second camera and the notebook are the only things still missing, and even these may be recovered in the low water stage of the autumn.

This research expedition saw something of conditions of present glaciers and past glaciation (a) in the Kenai Peninsula near Seward and the Alaska Northern Railway, (b) along the Copper River and Northwestern Railway near Mt. Wrangell and near Childs and Miles Glaciers, (c) along the White Pass and Yukon Railway from Whitehorse to Skagway, and (d) in southeastern Alaska near Lynn Canal, Glacier Bay, Taku Inlet, and the Stikine River. General glaciation was also studied in the Copper River and Tanana Valleys and the upper Yukon River, and pleistocene physiography along the middle Yukon, as at Dawson in the Klondike region and Fairbanks, Tanana, Rampart, Circle, Fort Yukon, and Eagle in the driftless portion of Alaska. The party travelled 1200 miles up the Yukon River by steamer and made the first summer journey ever attempted from the coast at Cordova by rail to Chitina and thence 320 miles across Alaska, on a buckboard, to Fairbanks. There is a winter mail trail here and it has been traversed with pack horses in summer but never before as a whole with a wheeled vehicle. The Alaska road commission and the stage company has each made one summer wagon journey from Valdez to Fairbanks but the Tarr and Martin party made the first wagon trip across the Chugach and Alaska Ranges and through the Copper and Tanana Valleys from Cordova to Fairbanks. Results of this four months of work during the summer of 1911 will be published by the National Geographic Society. L. M.

MR. H. V. RADFORD IN NORTHERN CANADA. The Society has received a letter from Artillery Lake, lat. 63° N. long. 108° W. (approx.) dated July 31, 1911, in which Mr. Radford said that he and T. G. Street, of Ottawa, had arrived from Great Slave Lake (*Bull.* Nov. 1911, p. 777), on the southern edge of the Barren Lands. They had traveled by canoe and portage 325 miles from Great Slave Lake in 21 days. At the time of writing, Mr. Radford was stopping at a camp of Yellow Knife Indians but was about to resume the journey to Chesterfield Inlet. Of the natives he says:

"These Yellow Knives are at present killing Barren Land caribou which are crossing Artillery Lake in large numbers, the southern migration having already begun. We have killed three for food with rifles. The natives are killing them with long slender spears after overtaking them in the water in their birch bark canoes. Several hundred caribou have been killed in ten days by half a dozen hunters. The women are busy drying and smoking the meat. The period of slaughter lasts about a month during which time the winter supply for the Indians and their sledge dogs must be accumulated. We have not yet seen the great herds of caribou that may be expected within the next three days. We have seen only the advance guard of the multitude, perhaps numbering 100,000 head, that pass here annually in July and August."

Mr. Radford says that he has discovered large inaccuracies in the present map of Great Slave Lake which is based largely upon the survey of Capt. George Back in 1833. Great Slave Lake is in fact two distinct lakes connected by a narrow river at one place hardly more than a fourth of a mile wide. It does not extend eastward beyond 111°42′ W. long. The long narrow island appearing on Back's map and later maps is really a point of the mainland. The slender body of water extending eastward for about 100 miles is called by the Yellow Knife *Tah Che Twa,* meaning the lake at the end of which the long portage begins. This division of Great Slave Lake into two distinct lakes greatly reduces the water area of Great Slave Lake proper; but on the other hand Mr. Radford says he has found that, on our present maps, land is indicated where a part of Great Slave Lake should appear.

He had hardly food sufficient to last to Chesterfield Inlet. If the relief supplies which he hoped to find there should fail him he would endeavor to retreat to Fort Churchill. He expected to reach Chesterfield Inlet in September and, if his supplies were there, to winter at Baker Lake, a little inland from the head of Chesterfield Inlet.

CLARK UNIVERSITY'S WORK IN GEOGRAPHY. Although Clark University at Worcester has no courses in geography it is doing a valuable work in that science. During the past few years three Conferences have been held for the discussion of different parts of the world. In October, 1909, a conference was held on "China and the Far East," and its results have been published in a volume bearing that title. In October, 1910, the second conference dealt with "The Nearer East and Africa." The papers there presented were published chiefly in the *Journal of Race Development,* a quarterly publication. The third conference, which took place at the end of November, 1911, was devoted entirely to Japan: its chief papers will probably be published first in the journal mentioned above, and later as a separate volume. The object of the conferences is to gather together men who can speak with authority on the countries concerned, and who, whether by residence, travel, long study, or birth are familiar with vital problems. It is the intention of Professor G. H. Blakeslee, to whose able management the success of the conferences is due, to so arrange the programs that all phases of life are considered. Political and historical subjects somewhat predominate, but social life, racial characteristics, education, religion, missions, industries, health and sanitation, geography, art, literature, and still other topics play a prominent part.

The *Journal of Race Development* was founded in connection with the conferences on different countries which have recently been held at Clark University, and is now in its second year. The responsible editor is Professor George H. Blakeslee, with whom is associated President G. Stanley Hall; while some twenty contributing editors represent various lines of research, including history, anthropology, geography, psychology, religion and other fields. The object of the *Journal* is to present facts of all kinds which bear on the problem of the development of races. Its special field is the more backward nations of the world, those which have just entered the comity of nations, or are still in a state of semi-civilization. In treating of these countries the editors put before themselves three purposes; first, to assist in the explanation of how races have come to be what they are; second, to discuss the methods whereby the more advanced races can aid those that are backward; and third, to bring out the many ways in which the more favored nations may be learners as well as teachers. E. H.

SOUTH AMERICA

THE RAILROAD AROUND THE UPPER MADEIRA. The *Bulletin* of the Pan American Union (Nov., 1911, p. 959), says that the construction of the railroad around the nineteen falls and rapids that obstruct navigation in the Upper Madeira and the lower Mamoré Rivers is making rapid progress. It will give Northern Bolivia steam communication with the Atlantic by way of the Madeira, its tributaries, the Mamoré and Beni, and the Amazon. Starting from Porto Velho on the Madeira, the road will be 211 miles long. A short branch line up the Beni R. will circumvent the Esperanza Falls crossing the Mamoré to the main line by a bridge a half mile long.

Railroad construction began in April 1910. The road was opened for train service on Sept. 17, 1911, to mile 163, on the Bolivian frontier at the mouth of the Abuna R. The first train made the journey in a little over eight hours. It has hitherto required about a month to take goods along this stretch of the Madeira including portages around the Falls. The completed road, with its river feeders in Bolivia will give to that country a good Atlantic outlet for much of its rubber, cattle, hides, sugar, cacao, copper, gold and other commodities.

AFRICA

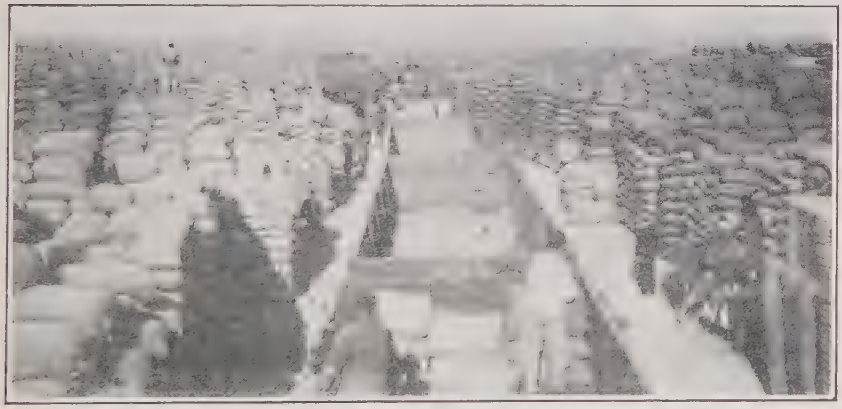
THE RAILROAD IN ERITREA. On Dec. 6 last year trains began running on the railroad from Massaua, the port of Eritrea on the Red Sea, to Asmara on the Abyssinian Plateau. The building of this road began in 1887 and it has been very gradually extended up the steep slopes to Asmara 73 miles from Massaua. The plateau having been reached, it will be comparatively easy to advance the line southward in Abyssinia and westward to the Anglo-Egyptian Sudan. Both of these projects are now under discussion. (*Rivista Geogr. Ital.*, Vol. 18, 1911, No. 10, p. 627.)

ASIA

Manchuria's Great Southern Port. Dairen is a seaport with a deep harbor on the Liaotung Peninsula of Manchuria. The Russians founded the port in 1899 on the south shore of Ta-lien-wan Bay and gave it the name of Dalny. The Russians were convinced that, as the southern commercial terminus of the Trans-Siberian R.R., the port would have a great future. Before the war between Russia and Japan, the port had made wonderful development and the Russians had built large wharves, warehouses, workshops, a cathedral, etc.

During the war between Japan and Russia, a large part of the port was destroyed. The Japanese have now rebuilt and extended the port, renamed it Dairen and have in the past four years developed an enormous export trade in beans, bean-cake, and oil-cake.

This picture shows a part of the wharves filled with bags of beans that were grown in Manchuria and now ready for export. Beans are one of the great crops of that region and the *Bulletin* of the Suez Canal Company (Nov. 2, 1911) says that a large part of the 1911 crop had already been sold in Europe. Manchuria is a splendid wheat country and both wheat and barley are largely grown; but of far greater importance in the export trade is beans which, together with bean-cake, and bean-oil, are the most important items in the external trade.



Export Beans on the Wharves of Dairen.

EUROPE

Population of Ireland. The census of Ireland, taken on the night of April 2, 1911, shows a total population for the island of 4,381,951 of whom 2,186,804 are males and 2,195,147 are females. These figures show a decrease in the population since 1901 of 76,824 persons. The population of the island in 1841 was 8,196,597 and every decennial enumeration since that time has shown a decrease.

POLAR

Ocean Route to the Yenisei and Obi Rivers. *The Board of Trade Journal* (Jan. 11, 1912, p. 88) says that the Russian Government Committee, which has been considering the project of the English navigator, Capt. Webster, for the establishment of regular trading intercourse between England and Siberia, has recommended that Capt. Webster be entrusted with the task of organizing regular steamship service to the Kara Sea and the estuaries of the Yenisei and Obi. His proposal is that ordinary tramp steamers shall run between England and Novaya Zemlia, calling on their way at Baltic ports. At Novaya Zemlia there is a good harbor on the southwest coast in lat. 72° N. which will be the discharging point for the Yenisei and Obi. Thence the freight will be carried to these Siberian rivers in vessels fitted to resist ice. They will be able to make three round trip voyages during the two months of the year that navigation is open. In addition to grain, the sea route will provide an outlet for Siberian timber, graphite, mica and other minerals.

OBITUARY

George Davidson. George Davidson, Emeritus Professor of Geography in the University of California, died at his home in San Francisco on December 2d, aged eighty-seven years. As a scientific Assistant in the Coast Survey he went to California in 1850, shortly after the discovery of gold there. He and three other young officers volunteered to go to the west coast and to perform for one year any duty, however hard or manual, incident to the survey of the western coast. This pledge was kept, not for one year only, but through all the subsequent years of the gold excitement. Labor was so expensive that Davidson was in the singular position of having to pay more for the services of subordinates than he himself received. Professor Davidson, as he was best known after 1870 when that title was given him by the University of California, was a most indefatigable worker not only as an officer of the Coast and Geodetic Survey in charge of field and administrative work, but also as a scientific investigator. An example of his untiring energy was given when the question of the variation of latitude was mooted by astronomers, and the International Geodetic Association proposed a plan for systematic observations all around the world to test the question. Professor Davidson voluntarily undertook to assist in this and began systematic observations at the Coast and Geodetic Survey's astronomical station in San Francisco in May, 1891. Every night, favorable for observations, during a period of fifteen months was devoted to this work.

Professor Davidson was in charge of the following expeditions sent out by the Government in the interests of science: To observe the total solar eclipse, at Humboldt Bay, Cal., May, 1854; to observe the solar eclipse, at Chilkat, Alaska, August 7, 1869; to observe the transit of Venus, at Nagasaki, Japan, December 9, 1874; to observe the total solar eclipse, at Santa Lucia Mountain, Cal., January 11, 1880; and to observe the transit of Venus, in New Mexico, December 6, 1882. He accompanied the first Government expedition to Alaska after the acquisition of that territory in 1867, and in addition to determining the latitude and longitude of the principal Russian settlements where the vessel touched, he collected a large amount of geographical information concerning that little-known country.

In 1874 he made a careful study, from the engineer's standpoint, of harbor improvements, etc., in Europe and the Orient, which prepared him to render valuable service on the Advisory Board of Harbor Improvement, San Francisco, and as a member of the Commission of Irrigation for California. When Cambridge, Mass., and San Francisco, Cal., were connected by telegraphic longitude, he was in charge of the San Francisco end of that work.

His books, pamphlets, and papers upon many phases of scientific, engineering, and geographical research number more than 260. They include papers on solar eclipses, transits of Venus, the geography and history of the Pacific States and Alaska, discussions of the early English, Spanish, and Russian voyages of discovery on the Pacific coast, and sailing directions for California, Oregon, Washington, and Alaska. His Pacific Coast Pilot is a volume of 700 pages, showing his remarkable capacity for study and research by its wealth of valuable historical and geographical information. Other scientific publications were two field catalogues of time stars, one of 983 and the other of 1278 stars; and a table of star factors, A. B. and C., for the reduction of time observations.

In recognition of the scientific work of Professor Davidson the degree of Ph.D. was conferred upon him by Santa Clara College in 1876; that of Sc.D. by the University of Pennsylvania in 1889; and that of LL.D. by the University of California in 1910. He was elected to the National Academy of Sciences in 1874, Regent of the University of California in 1877; appointed member of the Mississippi River Commission in 1888; delegate to the International Geodetic Association in 1889; elected corresponding member of the Bureau of Longitudes, France, 1894; elected member of the Academy of Sciences of the Institute of France in 1897; and created Knight of the Royal Order of Saint Olaf, Norway, in 1907. In 1908, he received the Daly Gold Medal of the American Geographical Society.

He was for sixteen years President of the California Academy of Sciences, and for thirty years President of the Pacific Geographical Society. In 1867 he devised a new instrument of precision which is known as the Davidson Meridian Instrument, and it has been generally used by the Coast and Geodetic Survey. He also perfected new forms for vertical clamps and tangent screws.

In addition to his services in the Survey he served on the Irrigation Commission of California; the Advisory Board of Harbor Improvement, San Francisco, Cal.; the Mississippi River Commission; and the United States Assay Commission. After severing his connection with the Coast and Geodetic Survey in 1895, Professor Davidson was a consulting engineer in San Francisco. Later, he was appointed Professor of Geography in the University of California, where his profound knowledge of his subject, his facility in imparting information, and his genial way with the students made this class one of the most popular in the university. J. J. GILBERT.

Mr. William Churchill has sent to the *Bulletin* these reminiscences of Professor Davidson:

"The Lick Observatory was Professor Davidson's suggestion. James Lick was seeking to dispose of his wealth. He had no knowledge of astronomy, no interest in the science, but he knew Davidson and respected the man who disregarded money-making for a higher though less gainful pursuit. His thought was drawn in the direction of a great telescope. He learned from Prof. Davidson that the greatest refractor was 30 inches. His idea was to multiply the Poltava glass by two; in other words, California should have a five-foot glass. He wrote in his will that the glass to bear his name should be twice as large as the biggest in the world. It took long argument from Davidson to secure the formation of a plan which was within human possibility. The observatory which crowns Mount Hamilton in the dry sky above the Santa Clara valley is the Lick Observatory, but we owe it to George Davidson.

"Word came to Professor Davidson, one day, that a butcher in Oakland was working to become an astronomer, beginning at the bottom, striving to make his own telescope and mount. Davidson went across the bay and talked astronomy to the butcher, took him to his own observatory on the summit of a San Francisco hill and gave the young enthusiast his first glimpse at the heavens through a powerful equatorial. Together they worked over the young man's home-made observatory. In Oakland was a certain rich man and George Davidson brought it to pass that the wealth of the rich man and the butcher's zeal for the heavenly science were harnessed for the public good. The city of Oakland was the first city of the world in which an observatory was made a part of the public school system, the Chabot Observatory; and the butcher who had sacrificed so much to make his own glass was appointed Director and had the rare pleasure of installing a good glass.

"When Professor Davidson wrote me after the San Francisco earthquake, the burden of his letter was that due credit should be given to the Weather Observer who had saved his instruments and had climbed columns still hot to reopen a station on a ruin over which the fire had swept. Not a word to tell me, that which I learned from others, that his own observatory had been thrown open to homeless women and children and that he had dismounted his equatorial lest in another shock it might menace these helpless sufferers."

COUNCILLOR JOHN S. BARNES. The death of Captain Barnes occurred on Nov. 22. At a meeting of the Council of the Society on Dec. 21, 1911, his death was announced and the following minute was adopted:

"In the death of John S. Barnes, The American Geographical Society has lost one of its most distinguished Fellows and the Council one of its most useful members. Born at West Point within the boundary of the nation's military reservation, and educated at The Naval Academy, Annapolis, his earliest associations as well as his academic environment tended to preserve in him the soldierly traits, which his distinguished ancestors had implanted, and helped develop in him the qualities which made him so useful in later life. His naval career early gave him a warm interest in travel and in geographical discovery and in 1874 he became a Fellow of this Society, and in 1907 a member of its Council. His wide range of intellectual interests, his devotion to the objects of his pursuit, his sturdy sense of obligation and devotion to the performance of all duties entrusted to him, and his sterling common sense and good judgment, all served to make him a valued and useful member of the Council and one whose absence will be much felt.

"*Therefore,* it is resolved that the Council of The American Geographical Society order that this minute be spread upon its records and that a copy of it be transmitted to the family of its late member, Captain John S. Barnes, together with the sympathy of this body for them in their bereavement."

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

The Mount McKinley Region, Alaska. By Alfred H. Brooks. With descriptions of the Igneous Rocks and of the Bonnifield and Kantishna Districts, by L. M. Prindle. Professional Paper 70, 234 pp., maps, illustrations and index. U. S. Geol. Survey, 1911.

In the exploration and development of Alaska, the work of the United States Geological Survey is destined to occupy first rank. It has been a geographic work of the highest importance, oftentimes carried on in a wholly unknown and unexplored field, and done in such an unostentatious manner that the outside world has known little about it. Some of the journeys made by members of the United States Geological Survey, perhaps barely and modestly referred to in a brief narrative prefacing a scientific report, have been really remarkable instances of daring exploration, rivaling some of the expeditions of less scientific character, that, with proper advertisement, have received widespread attention.

Among these expeditions is that made by Mr. Brooks, in 1902, into the then practically unknown Mount McKinley Region. In 105 days a distance of 800 miles was covered, largely in an unexplored region, traveling from the seacoast near the head of Cook Inlet across the Alaska Range to the Yukon River. During this journey, lasting from June 1 to September 15, the party traveled every day but nine, and when they reached Rampart on the Yukon only eleven out of the original twenty horses remained. Even the modest narrative of the expedition gives some idea of the great difficulties and dangers encountered.

Various conditions interfered with the early publication of the full report of this expedition, though some parts of it have appeared. As compensation for this delay it has been possible for Brooks to make use of the explorations of a number of other members of the Geological Survey in this general region and therefore to make his Mount McKinley report cover a far wider area than that of the mere traverse of 1902 and to introduce a much broader and more general consideration of the geographic and geologic features of this large area than would have been possible if published on the return of the expedition. Whereas the investigations of the original expedition covered an area of about 10,000 square miles, the subsequent studies have made it possible to discuss the features of an area equal to over 30,000 square miles.

The main portion of the Mount McKinley report is naturally devoted to geology, but there is a clear description of the geography of the large area included and an interpretation of the main physiographic features. It is shown that the geological history has been exceedingly complex as a result of changes of level, rock folding, igneous intrusion, and denudation; and, while not all the elements of the problems presented are worked out, the main features are discussed with that breadth of view which Brooks has already so clearly exhibited in his Professional Paper on "The Geology and Geography of Alaska." The paper is clearly and interestingly written, it includes a vast amount of detailed information, the many problems of general interest are adequately presented and discussed, and there are abundant illustrations, both maps and half tones. Some of the latter are really remarkable mountain photographs. One section of the report is devoted to a discussion of the topographic survey by D. L. Reabury, who adopts as the elevation of Mount McKinley 20,300 feet and of Mount Foraker 17,100 feet.

Brooks believes the region covered by his report to be one of high future promise. Already there has been considerable gold mining, and the region also includes the well known Matanuska coal fields concerning which Brooks says: "The high-grade steaming and coking coals of the Matanuska Valley have, so far as known, no equal in the Pacific states except in the Bering River field." Yet the extensive coal deposits of this region are untouched. He says: "Take it all in all, the Mount McKinley province, as here defined, is one of the richest parts of Alaska. It only needs better means of communication and more capital for large enterprises to continue the prosperity which it has had in the past. Such advancement will attract a population which in turn will make a local market for the farmer and assure a development of the agricultural resources, which are of no mean proportions . . The whole matter of agriculture in this part of Alaska hinges on the finding of a market. If railroad transportation to Fairbanks through the Susitna valley were available, no doubt an agricultural population would spring up along the route of travel."

Brooks makes clear, what is widely known to those who are familiar with Alaskan conditions, that neither the coal fields nor the agricultural resources can do other than lie dormant until the region is rendered accessible by railroads. Even in gold mining, only the richest ground "can be profitably exploited under the present high cost, which can not be materially reduced except by more direct and cheaper lines of communication with tidewater." It is the author's belief that a railway system is demanded from the coast into the Susitna and Matanuska basins, thence on to the navigable Tanana, supplemented by necessary branches and by a system of wagon roads and trails. He says that when such a transportation system "has been established to supplement the present water transportation, then, and then only, can a large industrial advancement be expected in this province."

Upon the question of the relative merits of government and private ownership, Mr. Brooks, as a scientific worker under the National Government, naturally remains silent.

R. S. TARR.

The Mineralogy of Arizona. By F. N. Guild. 103 pp. and index. The Chemical Publishing Co., Easton, Pa., 1910. 6½ x 5.

This small volume, in describing the minerals of Arizona, follows the classification used by Dana. The chapter headings are, accordingly, those of the descriptive mineralogy portion of the "Text Book of Mineralogy." In general, the notes on the minerals are brief, but when the minerals are peculiar to the

State as in the case of the Tuscon meteorites, Cañon Diablo iron, petrified wood, caliche (calcareous deposits) and so on, the treatment is fuller. The final chapter describes the new mineral discoveries in Arizona such as coronadite, morencite, copper pitch ore and arizonite. The book appears to be carefully compiled and it includes in the text references to the literature of the various minerals which greatly enlarges the usefulness of the book. ROBERT M. BROWN.

Highways and Byways of the Great Lakes. By Clifton Johnson. xiv and 328 pp., and illustrations. The Macmillan Company, New York, 1911. $2. 8 x 6.

Mr. Johnson follows parts of the lake shores, characterizes the people and their environment, hits off rather effectively the atmosphere of life and of things and helps us to see facts and conditions as well by his word pictures as by his photographs. This is the kind of geography that Mr. Johnson writes and though wholly of the popular order it serves a useful purpose. Perhaps the best feature of Mr. Johnson's books is that they give a graphic idea of how people live and what they are in various parts of our country.

Ye Kingdome of Accawmacke or the Eastern Shore of Virginia in the Seventeenth Century. By Jennings Cropper Wise. x and 406 pp., appendix and index. The Bell Book Stationery Co., Richmond, Va., 1911. $2. 9 x 6.

An interesting and instructive book. The narrow peninsula extending southward from Maryland between Chesapeake Bay and the Atlantic Ocean, being two counties of Virginia, is the land of this history. The story begins with Verrazano's reputed discovery of this eastern shore in 1524 and ends with the calming of the excited colonists, inflamed over religious matters, by the abdication of James II during the closing years of the seventeenth century. Within these pages there is detailed history of local affairs and also themes of a broader scope and a more far reaching application. Five chapters, following the historical narrative proper, trace the connection with this peninsula of various uncorrelated customs, resources and concomitants such as the church, industries, commerce, horses, game, fish, social customs and the like. All of this is live material written in a spirited fashion; and whether the text discusses the origin of the "banker" pony or tells of Margaret Teackle's desecration of her reverend father's house by holding therein a Sunday dance in his absence, the author wrote with a broad knowledge of his subject based upon a large fund of details and an abiding interest in this little "kingdom of Accawmacke." ROBERT M. BROWN.

A Historical Geography of the British Colonies. By J. D. Rogers. Vol. V: Canada. Part III: Geographical. v and 302 pp., maps and index. Part IV: Newfoundland. xii and 274 pp., maps and index. Clarendon Press, Oxford, 1911. 7½ x 5 each.

These are intensely interesting books dealing in a comprehensive way with the development of the British Colonies in North America. Part III of Volume V, in eleven chapters, covers the mainland provinces and presents the salient points of the history and growth of each. One chapter is the story of the northern tundra and of the explorers who invaded the far north-land; another chapter is an account of Nova Scotia, replete with tragedy and romance; the third discusses New Brunswick as a link between Nova Scotia and Quebec; the fourth embraces the province of Quebec as the "history of two nations and one river"; the fifth deals largely with the development of the mines in Ontario; the sixth presents the story of the prairies as the dwelling place of peoples of many nations; and the seventh describes the mountains of the west and north-west and points out the responses to this topography. Each portion of this great colony is treated in a similar manner. The geographical and frequently the geological basis is presented first, then follows an account of the occupancy of the land and the stages of development and finally the resources of the section are introduced. Although it is impossible, in a small volume, to deal broadly with all phases of human development in this wide expanse, yet the author has given a valuable and thorough summary of the historical geography of the area.

Part IV of Volume V is more interesting still, perhaps, because the subject, Newfoundland, can hardly be treated, if properly done, in the usual way. It is "*sui generis* and an exception to the rule in the British Empire." The first half of the book tells the stories of discoveries of fisheries, colonization and of crises in which there is much romance and much diplomacy. The early history of the island teems with thrilling incidents of exploration and bravery; then came the controversies, "the din of three Anglo-French duels," and the third period of its history is filled with arguments over its industry and its destiny. The book ends with a few rare chapters on the fish. "Cod-fish, alive or dead, wet or dry, have exercised an all-pervading influence over the destiny of Newfoundland."

ROBERT M. BROWN.

The Iron Ores of Lake Superior. Containing Some Facts of Interest Relating to Mining and Shipping of the Ore and Location of Principal Mines. By Benedict Crowell and C. B. Murray. 186 pp., maps and index. The Penton Publishing Company, Cleveland, 1911. 9 x 6.

Describes the different mineral ranges and most of the mines on them; gives the history, geology, mineralogy and mining methods of the various districts; with maps showing the location of ore ranges and of the upper and lower lake ports.

Vancouver Island, B. C., Canada. The Treasure Island. Agriculture, Timber, Mines and Fisheries. A History of Its Resources by Districts. 126 pp. and illustrations. The Vancouver Island Development League, 1911. 10 x 6½.

Vancouver Island about a third as large as New York State if the nearby islands pertaining to it are included, is very rich in timber, coal, and other minerals, and its agricultural possibilities are great. The book, illustrated by photo-engravings, gives many glimpses of the island and of the opportunities it offers for all kinds of enterprise.

Beyond the Mexican Sierras. By Dillon Wallace. xxxv and 301 pp., map, illustrations and index. A. C. McClurg & Co., Chicago, 1910. $2. 8 x 5½.

A popular, well-written account of the author's journey in the little-known section of Mexico lying west of the Sierras and between the States of Sonora and Jalisco. In this part of western Mexico Mr. Wallace traveled, on muleback, over 1,000 miles gaining much information and taking many photographs. He has turned a large variety of material to good account in this book.

SOUTH AMERICA

L'Espansione Coloniale e Commerciale dell' Italia nel Brasile. By Dott. Pietro Ubaldi. 266 pp., index and bibliography. Ermanno Loescher & Co., Rome, 1911. 11 x 6½.

In 1905, 120,000 Italian emigrants settled in Brazil. In 1906 the Italian emigration into that Republic numbered 137,000 souls. This book gives the reasons why many thousands of Italians are seeking new homes or new opportunities to work in foreign lands. It then describes the various States of Brazil and notes the opportunities and advantages which each offers, if any, to foreign immigration. The book is a good specimen of the large amount of literature, much of it published by the government, that is constantly appearing in Italy for the guidance of Italian emigrants.

South American Trade. By Charles M. Pepper. 17 pp. and illustration. Alexander Hamilton Institute, New York, 1911. 8½ x 5½.

One of a series of lectures delivered in New York City. The short paper indincates the kinds of information and the nature of the studies that are most helpful in extending trade into foreign countries.

The Andean Land. (South America.) By Chase S. Osborn. Vol. I, xv and 312 pp., maps and illustrations. Vol. II, x and 331 pp., illustrations and index. A. C. McClurg & Co., Chicago, 1909. 8½ x 5½.

The author, a newspaper publisher of Michigan, has written on western South America intelligently and in an interesting manner from the standpoint of the man of affairs. So far the book will be found useful. It is not a geographical work.

Chile. Its History and Development, Natural Features, Products, Commerce and Present Conditions. By G. F. Scott Elliot. With an Introduction by Martin Hume. Map, illustrations, appendix, bibliography and index. xxviii and 363 pp. Charles Scribner's Sons, New York, 1907. 9 x 6.

Out of the 341 pages of text that compose this volume, 240 are dedicated to historical subjects foreign, largely, to Geography. Hence they can only be alluded to here. Neither would they deserve much attention at any rate. The last 101 pages (chapters XVI to XXII) relate to various subjects. Thus chapter XVI treats promiscuously of Government, people, food, and more matter equally congenial. The author says some very good things but also some very unjust and silly ones. The chapter following is devoted to mining and to nitrates. Valparaiso and Santiago are next passed in review. On this occasion he informs us that the young German is inferior to the young Englishman in mental powers and physical strength. That young Englishman in Chile he describes: "The young Englishman is considered essentially a schoolboy. His real life consists in lawn tennis, cricket, or polo . . . The office work corresponds to lessons." There are interesting statistical data, though not many. The other parts of the book, to the end, are of the same character in general, quite light reading, quite often fair in the judgments they express, but not of the least special importance. It is one of the very numerous books on foreign lands with which literature is flooded to-day. Illustrations are generally good, but stale. A map of Chile, after the well-known type, clings to the end, and a pretended bibliography also graces the volume. AD. F. B.

AFRICA

The Delagoa Directory. 1911. A Year-Book of Information regarding the Port and Town of Lourenço Marques. 158 pp. A. W. Bayly & Co., Lourenço Marques, 1911. 2s. 6d. 8 x 5.

Gives much useful information about Lourenço Marques and is important for all who do business with that port. In the year ending June 30, 1910, 671 vessels entered, bringing 594,396 tons of freight and 53,300 passengers. The town is closely connected with the trade of South Africa, the channel has been lighted so that it may be used day or night and the port has been made as healthful as any other South African coast town by filling up marshy lands and other sanitary measures.

Mission en Éthiopie (1901–1903). Jean Duchesne-Fournet. Two Volumes and Atlas. Vol. I, xviii and 440 pp., maps and illustrations; Vol. II, xv and 387 pp. and illustrations. Masson et Cie, Paris, 1909. Atlas 1908.

These handsome volumes are a monument to the memory of the young explorer Jean Duchesne-Fournet who died in 1904, the year after he finished his explorations. Before he went to Abyssinia he spent much time in studious preparation for his work of investigating the various aspects of the little-known regions he and his party were to visit. The scientific mission was in the field from October, 1901, to January, 1903. It made its way from Jibuti to Adis Ababa by a new route through the Danakil region; it traversed, by partly unknown routes, the plateaus of Shoa and Gojam to Lake Tsana around whose shores the party traveled on foot. The leader also made a visit to the Walaga gold region. Special attention was given to ethnology, geology, zoology and the conditions of the people. The leader was aided in his work by a number of distinguished scientific men and the history of the exploration and results is divided into eight parts: Henri Froidevaux tells the story of the expedition from the material left by Duchesne and the reports of his comrades. The economic condition of Abyssinia is discussed by Capt. Collat, geology by Mr. Arsandaux, anthropology and ethnography by Dr. Verneau, and Pierre Lesne has six pages on insects. The maps were drawn by Mr. G. Hutin from Capt. Collat's itineraries and notes. There is a bibliography of 347 works, and an important section by J. Blanchart on the Abyssinian manuscripts collected by the expedition. The various sections are illustrated by numerous maps, nearly 200 illustrations in the text and 40 separate plates of photo-engravings. These handsome volumes are a worthy memorial of the young explorer who accomplished much for science in the last years of his life.

ASIA

The Native States of India. By Sir William Lee-Warner, K.C.S.I. xxi and 425 pp., map and index. Macmillan & Co., Ltd., London, 1910. $3.25. 9 x 5½.

A second edition of the book originally published under the title "The Protected Princes of India." It is an historical treatment of the British occupancy in India, comprehensive and broad in its content and method. It is easy to comprehend that a union of the disjointed principalities of India was a work of very slow growth continually involving new situations with no precedents to help towards their solution. The opening chapter outlines the influences adverse to the union of the native states under one dominant authority. Up to 1813, until the close of Lord Minto's rule as governor-general, the policy was one of non-intervention towards the princes of the country and this, after a series of wars and treaties, grew into the "policy of the ring fence" in which a more perfect union was established and the maintenance of small forces, allies of the Imperial troops, was encouraged in the states within the Company's "boundary fence." Following came the "policy of subordinate isolation" in which Lord Hastings emphasized principally military coöperation; and this continued with slight changes to the "policy of subordinate union" and trust. The author then details the "price of union," discusses the duty of the sovereign towards the states in defending them against aggression and presents many other phases of the subject. The book is an excellent dissertation on the policy of Great Britain in India.

R. M. Brown.

The Special Population Census of Formosa. 1905. Report of the Committee of the Formosan Census Investigation. 210 pp., map and illustrations. Imperial Printing Bureau, Tokyo, 1909. 12s. 6d. 10½ x 7½.

Describes the methods devised for taking a census of the Formosan peoples in 1905. The aim of the Provisional Bureau of Census Investigation was to find how best to ascertain the real conditions of the population. This report gives both the methods and results of the census inquiry. The methods were devised beween September, 1903 and October 1st, 1905 when the first census under the Japanese régime was taken.

The census returns gave an enormous amount of information on many topics, some of which have not often been made the subject of census inquiry. For example, it was found that of the total female population of 1,406,224, 800,616 had been subjected to the practice of foot-binding; in other words 56.9 per cent. of the Formosan and Chinese women living in the island bind their feet. The occupation or non-occupation of foot-bound women was investigated with resulting statistics. The opium smokers and eaters form 3.9 per cent. of all the Formosans and Chinese; 88.2 per cent. of the smokers are males and 11.2 per cent. are females. This work is especially noteworthy as a study of census methods in a land whose conditions are, in some respects, exceptional.

The Story of Korea. By Joseph H. Longford. 400 pp., maps, illustrations, bibliography and index. Charles Scribner's Sons, New York, 1911. 9 x 6.

The author's personal acquaintance and administrative association with the affairs of the Far East have had a two-fold effect upon this volume. Large as it is in itself and very entertainingly written it is no more than an introduction to the history of Chosen as set forth by others more voluminously. That he has been able to condense and to bring out the more valuable portions of the work of duller historians is a matter on which the author should receive congratulations. On the other hand, his intimate association with a territory which has always been under dispute since its history began is complicating to any estimate of the value of this study of Korean affairs. Mr. Longford's affiliations are all with Japan, his service as British Consul was at Nagasaki, King's College in London has given him the chair of Japanese. It is pardonable in one so placed to look at the facing peninsula from Nagasaki through Japanese eyes, or from a London professorial chair with full consciousness of the fact that his home land and the land of his professional activity entered into a stout treaty.

The author knows his Japan, he shows that he knows Korea well; if he finds reason to believe that Japan can bring order out of the ancient chaos of Chosen and put it to use it is impossible to find serious fault with his opinion. But in using his book it may be just as well to recognize that the attitude is strongly Japanese. So far as it relates the story of the Koreans the book is illuminative. It brings together much that we do not recall from earlier authorities. It offers, in a consistent and well balanced narrative, much that will serve the needs of those who wish to have a proper acquaintance with the affairs of the Hermit Kingdom up to the time of its virtual absorption by Japan.

William Churchill.

AUSTRALASIA AND OCEANIA.

New Zealand Plants and Their Story. By L. Cockayne. vii and 190 pp., 71 illustrations and index. John Mackay, Government Printer, Wellington, 1910. 8½ x 5½.

Dr. Cockayne has written a delightful account of the plants of New Zealand which, although addressed to the general reader, can be illuminating to persons skilled in botanical lore. The treatment covers, in the early pages, many topics in the border land of the science, but deals specifically with the island plants in the major portion of the book, discussing them on ecological lines. It opens with the general history of the plants in the geological eras, states the conditions of the struggle for existence and sets forth the rival doctrines of evolution by which changes of form are explained. The work ends with a suggestive chapter on plant teaching in the schools. The plan of the book dictates to some degree the various chapter headings; as Forests, Natural Shrubberies, Vegetation of the Coast, Meadows, Plants of the Fresh Water, Swamps and Bogs and the Plants of the Outlying Islands. The islands under the rain-forest climate, (adopting the classification of Schimper), the struggle of the coast plants against the shifting sands, the evolution of meadows, the naturalized plants and the stories of some of the common plants are some of the lines along which the discussion runs. An excellent selection of photographs is found in the volume. Robert M. Brown.

Handbook of the Territory of Papua. Compiled by the Hon. Staniforth Smith, Administrator. 163 pp., maps, illustrations and appendices. Second Edition. Dept. of Lands, Papua. 1s. 6d. 9 x 6.

British New Guinea, now officially known as Papua, has in recent years attracted attention as a field for settlement and investment. The expansion of its agricultural industries is especially noteworthy. In this second edition the text has been largely rewritten and most of the information is brought down to the middle of 1909. It condenses a great deal of information relating to the territory.

Beach-La-Mar. The Jargon or Trade Speech of the Western Pacific. By William Churchill. 53 pp. and bibliography. The Carnegie Institution, Washington, 1911. 10 x 7.

Mr. Churchill defines jargon as the speech of necessity, the language of the borderland and tells how it most commonly begins in the need for communication between strangers. Among the most conspicuous examples he lists the *lingua* *franca* of the Venetians and Genoese in the Levant, the "pidgin English" of the treaty ports of China, the Chinook, the jargon of the Western American fur trade, the Beach-La-Mar and others in Africa and Latin America. He describes the formation, the sources and use of the jargon, Beach-La-Mar, the vocabulary of which fills 22 pages.

EUROPE

Four Months Afoot in Spain. By Harry A. Franck. 370 pp. and illustrations. The Century Co., New York, 1911. $2. 8½ x 6.

One of the unique books of the day. The same fascinating style that marked the author's "A Vagabond's Journey Around the World," here holds the attention of the reader. The author's purpose is to get out of the usual track of travel, visit unfamiliar portions of the land and become acquainted with the people in their homes. You accompany the author as he tramps through districts which ordinary tourists have no way to reach and the regular traveler passes by; get in touch with the common life; find the condition of places and people vividly told and are made to see and feel the reality of the life described. Glimpses of the mines, rivers, fields, crops and climate enhance the story and add to its geographic value.

The reader feels, when he finishes the book that he is no longer a stranger in a strange land. The little that satisfies the masses in their daily existence; the amusements that break the monotony of their treadmill round; the religious duties that have become the necessary forms of their social life; all these are learned and understood. Beside the literary value of the work, there is much interest in the photographic views with which it is plentifully illustrated.

G. D. Hubbard.

Entstehung und Bau der deutschen Mittelgebirge. Von Dr. R. Reinisch. viii and 206 pp., 48 maps, profiles, etc. Dieterich'sche Verlagsbuchhandlung, Theodor Weicher, Leipzig, 1910. M. 3.50.

This book will be welcomed by many who have felt the want of a short modern handbook of the geology of Germany. Although strictly scientific in character it keeps aloof from purely technical discussions of geological and mineralogical matters, so that the reader can use it to advantage without being a specialist. It will probably be especially useful as an explanation to the sheets of the geological map of Germany where the larger book by Lepsius is not obtainable, as a guide for teachers who, with only limited time for study, feel the need of a more thorough acquaintance with the subject than the general textbook can convey, and also for the geographer or traveler who is looking for the geological foundations of the scenery, settlement, industries, traffic, etc., in studying or visiting the mountainous and hilly parts of Germany. For all these people the book will serve as an excellent manual and work of reference, especially by means of its fine alphabetical subject index and numerous sketches; and it would be even more useful if the arrangement of the matter did not suffer from a certain lack of system.

To be sure the author declares that his intention is to treat his subject in accordance with natural divisions and geographical units; but he does not always make good his intention. The different chapters are not marked in any way that might help the reader to distinguish main divisions and subdivisions; the summaries sometimes refer to one, sometimes to two chapters; even the types which are used for the chapter headings are chosen without regard to their place in the system, so that one and the same type denotes what is printed in the index as a new chapter in one case, and in another, as a mere subheading. This lack of correspondence between the index and the text cannot but produce bewilderment in the minds of readers not previously familiar with the subject, and it even prevents those who are from gaining a perfect appreciation of the author's method and point of view. In a second edition attention ought to be paid to this matter that the book may become as popular as it deserves to be. M. K. GENTHE.

Albanien und die Albanesen. Landschafts- und Charakterbilder. Gesammelt von Paul Siebertz. 274 pp., and illustrations. Verlag der Manz'schen k. u. k, Hof-Verlag und Universitätsbuchhandlung in Wien, 1910. Kr. 5.

The author, editor-in-chief of the Vienna *Vaterland,* and one of the few travelers who has crossed the highlands of northern Albania, tells us with the skill of the journalist about his experiences in that out of the way corner of Turkey, its history and traditions, language, poetry, laws and customs, its landscape, and its political conditions. He has certainly succeeded in working the incongruous components of his story into one apparently homogenous whole which gives us a clear and interesting picture of the country as seen by a well educated contemporary. When we read in his book that, owing to the laws of vendetta, every man carries firearms; that disarming a man is a crime punishable by a fine of 2000 piasters; that a man may have all his property confiscated under the law of the land, with no exception but his arms; that the revolver belongs to the desk of the bishop as well as to the belt of the ministrant at high mass, then we understand that only shortsighted politicians, who have no idea of real conditions, can think of forbidding such a people the carrying of firearms.

The book is well illustrated, it contains an extensive bibliography of the country, and may be recommended for supplementary reading. M. K. GENTHE.

The Isles of Scilly. Their Story, their Folk and their Flowers. Painted and Described by Jessie Mothersole. Map, illustrations and index. xii and 244 pp. The Religious Tract Society, London, 1911. 10s. 6d. 9 x 7.

The author is an artist who illustrates her notes on the Scilly Islands by very pleasing pictures, the product of her own brush. She has recorded her impressions of these beautiful islands both in color and in words and both phases of the work are admirably carried out.

Das vorgeschichtliche Europa. Kulturen und Völker. Von Dr. Hans Hahne. 130 pp., illustrations and index. Verlag von Velhagen & Klasing, Bielefeld und Leipzig, 1910. Mk. 4. 10 x 7.

An able and interesting popular exposition of prehistoric man in Europe soundly based on scientific studies; together with many facts illustrating the arts of Greece and Rome. The 150 illustrations are excellent.

Le Royaume de Monténégro. Par M. C. Verloop. 101 pp. and map. Berger-Levrault, Éditeurs, Paris, 1911. 3 frs. 10 x 6½.

A monograph on this new kingdom giving chapters on its history, the manners and customs of the people, centers of the population, financial condition, progress of civilization and education, governmental régime, etc. When Nicolas I began his reign in 1880 as Prince of Montenegro there were only three schools in the country. To-day each village has its school.

POLAR

The Great White North. The Story of Polar Exploration from the Earliest Times to the Discovery of the Pole. By Helen S. Wright. xviii and 489 pp., maps, illustrations and index. The Macmillan Co., New York, 1910. $2.50. 7½ x 5½.

The book tells merely the human story; the struggles to reach a goal, the difficulties of travel, the hardships from cold and hunger, etc. Although such incidents may show "the splendid fibre of which" the explorer is made, it may be doubted whether they will make polar exploration any more popular with the sceptics or "stir the laymen to a better endurance of the burdens and perplexities of the common lot."

The book is largely a compilation of quotations from explorers' narratives, each traveler presenting his own story of his sufferings and dangers. Among the illustrations is an excellent series of photographs of voyagers to the frozen north from Sebastian Cabot down the centuries to Peary. R. M. Brown.

EDUCATIONAL

A Systematic Geography of America. By George William Webb, B.A. 108 pp., with ten diagrams, maps, and index. Methuen & Co., Ltd., London, 1911. 1s. 7½ x 5.

This is the fourth book in a series which provides for a study of the geography of the world on lines recommended by the London Board of Education. In this small volume Mr. Webb has condensed as much of the geography of North and South America as is considered essential for candidates preparing for fairly advanced examinations. No doubt the book is fitted for British needs, but as geography is taught at present in our schools the book will hardly be useful here. If the time ever comes when our High Schools shall demand of each graduate some such systematized knowledge of the world, it is to be hoped that the World Series which shall be prepared for these students may embody the excellencies of the present volume while avoiding its defects.

It is surprising to find in a book bearing the imprint of the current year that "the chief economic importance of Alaska is in its seal fisheries, but it is thought the country possesses gold deposits." Here, too, is to be found the old belief in the intactness of the Japan Current after a journey across the Pacific. British students are also told that our states number forty-four, that our chief source of petroleum is in western Pennsylvania, and that Boston is regarded as the intellectual center of the United States. Such statements are an added evidence of how difficult it is for our British cousins to keep up with the rapid pace of things American, but they are perhaps the chief defects in what is otherwise an extremely well-ordered, compact, and comprehensive survey of the geography of the New World. C. W. Hotchkiss.

Europe and the Mediterranean Region. By J. B. Reynolds, B.A. viii and 184 pp., maps, illustrations and index. Adam and Charles Black, London, 1911. 1s. 4d. 7 x 4½.

A text book intended for children in the upper classes of elementary and lower classes of secondary schools. The book is cogently and clearly written and illustrated chiefly by excellent black and white maps containing no more information than is intended for study purposes. The geography of the Continent is treated not by countries but by natural regions which certainly form broader and more scientific units for description than small political divisions. Each chapter is supplemented by helpful summaries, questions and suggestions.

Exercises in Practical Geography on the British Isles. By Cyril R. Dudley. Maps. 60 pp. With supplement; The London Area. By J. A. White. 8 pp., maps. George Philip & Son, Ltd., London, 1911. 1s. 8 x 6½.

The author provides a manual of exercises in Geography for a limited area. The plan is deductive, in the main, and the book is designed for children in intermediate grades. England is studied from fourteen, Scotland from eight and Ireland from seven maps. Each map presents but one or two kinds of data and is followed with questions based on the map, or calling for comparisons or correlations involving two or more maps. Thus rainfall and altitude are correlated; railroads and cities or products; topography and roads, or occupations; place relations and commercial connections, etc. In this way, while the fundamentals of Geography are being discovered, the places are learned and always connected with a reason. An atlas should be used with the exercises. Two brief supplements, one on the London District and one on the Wirral Peninsula, illustrate a suggestive method of treating Home Geography. G. D. HUBBARD.

System der Welthandelslehre. Ein Lehr und Handbuch des internationalen Handels. Von Dr. Joseph Hellauer. Erster Band: Allgemeine Welthandelslehre. 1. Teil. xvi and 482 pp. Puttkammer & Mühlbrecht, Berlin, 1910. M. 10. 9½ x 6½.

A systematic and thorough treatment of the more general phases of international commerce. This volume, the only one published as yet, deals with the broader phases of the development of international commerce, such as its organization, commercial treaties, financial exchanges, etc. It is a good book both for advanced commercial courses and also as a work of reference. The remainder of the work will treat of the more special divisions of the subject, such as communications, transportation, etc.

Agricultural Instruction in the Public High Schools of the United States. By Clarence Hall Robison, Ph.D. 205 pp., map and index. Teachers College, Columbia University, New York, 1911. 10½ x 6½.

Gives a brief historical sketch of agricultural education, classifies the agencies that carry it on, shows the importance of agricultural instruction in the high schools, outlines the methods of teaching agriculture in a number of typical high schools and presents a great deal of detailed information on the purposes and methods of instruction in this branch. A large part of the material was collected by the author by personal visits to schools, universities, agricultural colleges, officers and teachers in a number of states.

GENERAL

The Mind of Primitive Man. By Franz Boas. x and 294 pp. The Macmillan Co., New York, 1911. $1.50. 7½ x 5½.

This is a series of lectures which Prof. Boas has twice delivered in communities as widely sundered as Boston and Mexico. Each lecture, now become a chapter in a volume whose title is most attractive, has received preliminary presentation in various publications. It will be found convenient that this volume includes the author's views upon the changes in our own community which mark the progress of the second generation of immigrant stock. This paper has been roundly discussed, it has been somewhat sharply attacked and is still *sub judice;* it is distinctly advantageous, therefore, that now we may study it in connection with the scheme of which it forms an integral part in the author's order of development.

This inclusion shows that the volume contains some material that is by no means to be classed as pertaining to primitive man. There is other of the sort. In fact when we segregate the material of this kind, the amount of material herein which may be classed as primitive man's psychology is slight in extent and of diffuse treatment. It is all interesting, but does it really carry the title?

Inasmuch as I have the privilege of my signature I feel it proper to write personally in this matter. A work of this sort is secondary; it must, to have value, sum up the results of observation directed upon the minds of many men all primitive and living under primitive conditions or under such an approach thereto as will admit of our removing the alien factor which we have introduced by our coming. Now where is this basic material to be found? "Unfortunately," says Prof. Boas with whole truth, "the descriptions of the state of mind of primitive people, such as are given by most travellers, are too superficial to be used for psychological investigation." In this our author confesses that the foundation is lacking to such studies. The only foundation can lie in the intimate examination which shall set forth clearly and with quick sympathy what this and that primitive man thinks and how he thinks it.

Because of an act of self-abnegation it is not in contravention of proper modesty that I note that I have made such a study of one primitive folk. It takes years for that sort of thing. The babes whom I have seen fondled in savage arms have come to maturity and have gone to savage ends or have settled down as leaders of their slim communities. It seemed to me that in all these years of study, much of it spent in daily life and abundant observation, I might have fitted myself to describe the psychology of just that one race, the Polynesian of the South Sea. That book I have written, and having written I have again read it, more than 100,000 words; without regret I have put it aside; it is not the book of the savage mind, not the Polynesian mind which I had hoped to record. There are yet unsolved problems of sense perception, of speech, of logical method; the very principia are yet to find. Sometime I may return to the unfinished task, I hope that I may. But if there can be such failure of performance in just one group of primitive minds, where is there any greater success in the comprehension of other groups? And without such work of the first degree the work of the second degree is without authority. We cannot establish the principles of mental activity until we have a clear comprehension of the nature and operation of mental acts. First must come the particular, and the particular is not always comprehensible. Drawing just from my own experience, why do the Hu-Mangareva speak of the "red rainbow"? Is that optical or intellectual? Or who can tell why all Polynesians on looking at a print rotate it through ninety degrees widdershins; is that optical? Or why do they say, and think, "down and up," "west or east?" Or why do so many of them in the finger count reckon the fingers which are turned down and not those stuck up? If we fail to comprehend these little things we cannot go on to the greater.

This volume of essays by Prof. Boas in a field which we must regard as untillable as yet will serve its own good end if it prove a challenge and a stimulus to ethnologists to provide the basic material. Just a beginning has been made. In the Cambridge expedition to Torres Straits a few initial attempts were made to secure records along the methods of the new psychology. Whatever be the method employed the need is great for intelligent and appreciative collection of data. WILLIAM CHURCHILL.

Burmese Self-Taught. (In Burmese and Roman Characters) with Phonetic Pronunciation. (Thimm's System.) By R. F. St. A. St. John, Hon. M.A. 168 pp. E. Marlborough & Co., London, 1911. $1.50. 7 x 5.

This forms one of a series of pocket books for the study of alien languages according to a system which, in the case of the European languages, appears to include a laundry list in place of a chrestomathy. The guiding principle of the method seems to be a system of transliteration. The appeal in any such method must lie to the eye, it therefore creates an artificial Burmese which the eye of man never shall see. So far as the aim is to educate the ear and thence the speech organs through sight we see no advantage in this over the simpler method of learning the vernacular alphabet and its sound through the characters which will be always presented to the sight. An alphabet such as that of the Pali with its 32 consonants, 8 vowels and 3 diphthongs should entail no great task of acquisition for the adult student; and once acquired by the eye and the proper sounds enjoined upon the organs of speech there remains no need for the ungainly columns of transliteration. Sixteen pages of this work are devoted to the alphabet and phonetics, the whole of the syntax of the language is crowded within exactly the same number of pages. Few languages are satisfactorily to be learned by sight alone, the difficulty is infinitely greater when the language is tonal; this handbook dismisses the subject of the tones with scarcely more than a hint that therein lies the greatest difficulty. If the system of pronunciation prove feasible the vocabularies and lists of conversations topically arranged should assist the newcomer in the land. WILLIAM CHURCHILL.

History of Geology. By Horace B. Woodward. (In series: A History of the Sciences.) viii and 204 pp., illustrations, bibliography and index. G. P. Putnam's Sons, New York, 1911. 75 cents. 6½ x 4½.

According to this concise little volume the beginnings of recorded geologic observation date from about 500 B. C. and even geologic theories developed as early as 300 B. C. From these foregleams the growth of the body of geologic truth is fascinatingly traced through Greek, Roman, and Monastic stages, into Zittel's "Heroic Age" in 1790-1820. Chapters II to IV recount the names and achievements, in a more or less biographical style, of a long list of founders of Geology.

Over 350 persons connected with the science are mentioned, together with many organizations,—Surveys and Societies. The pioneer work of Sedgwick and Murchison in interpreting the structure and unraveling the succession of events in the early Paleozoic of the Lake Districts and much of Wales shows the method of geology and the great obstacles overcome in getting a start in stratigraphic geology. The fundamental work of Lyell and Dana in setting down the principles of Geology is graphically sketched. The brief chapter on Paleontology clearly sets forth the position of both those who would interpret geologic succession on a life basis alone, and those who give large place to geographic changes, and physical geology in the solution of problems of geologic synchronism.

G. D. HUBBARD.

L'État présent et de l'avenir de l'Islam. Par E. Montet. Index. 157 pp. Paul Geuthner, Paris, 1911. 10 x 6½.

Each of these six brilliant and sympathetic lectures is a sketch, yet each seizes upon some one unit in the sketch for development into portrait detail and portrait accuracy. The topic is one of great moment to France, which stands between Great Britain and the Netherlands in the second rank among the great Moslem powers of Christendom. It is trite, merely statistical and census reading, to note that King George might challenge the right of the Sultan to the position of Commander of the Faithful.

When the student shakes off the dominance of columns of mere figures it will appear convincingly that France stands first in the order of Moslem powers. Great Britain has to deal in India with a large mass of Mohammedans as a political factor, racial and economic problems loosely associated by the recital of a creed almost as brief and all-comprehensive as the Schma Yisroel of the senior branch of the Semitic monotheism. Not at all on religious grounds are the Indian followers of the Prophet a disturbing factor. Faith with them is in coma. Still less in the East Indies do the Dutch have to hold in check a proselytizing movement, Islam has spent its bolt in the island chain from Atjeh to the Philippine Moros. The sternest and most repressive ordinance which Batavia has found it necessary to fulminate is a mere rider to the poor law to the effect that the holy man who has made the Hadj and has come back from Mecca must work for his living just as before.

But the Islam of France, in its great African domain, is yet a living faith, though strangely in parts distorted. It is alive with the zeal of religious conquest. It seeks to carry the Crescent into the wilds quite as hotly as when the Saracens from Barbary swept Europe to their fatal encounter with the hammer of Charles Martel, and that we must not forget was on the French face of the Pyrenees. We recall Tippu Tib living in rude profusion in Zanzibar. The world united in denouncing him, a most agreeable person to meet, as the scourge of Africa. He would be the last to deny that he ravaged the forests of the Congo in his slave raids. Yet we must not forget that in some manner mysterious to our comprehension, Tippu Tib was a missionary of the faith in which he believed. At the limit of to-day's incursion upon the pagans of the forest there would be found slaves yoked in pairs, villages aflame, the horror of cruel war; yet where yesterday's raid had done its work we should find the folk rebuilding their thatched houses about the charred posts. But a change had been made in some mysterious fashion. Five times a day the call to prayer was rising from throats which scarcely had caught the trick of the words and every face was turned to the Kaaba. We may scarcely comprehend the polemics of such theology, but it is a very vital force.

Prof. Montet has caught the spirit of this pouring out of soul. His sketches show that Islam is always to be dealt with in the Africa which France has under control. It is impracticable to go into the detail of his six chapters, each a gem of research and each instinct with sympathy, in which he sets forth the orthodoxy and the heresy of Islam, the power of the fraternities, the movement toward reform, in which we fear that he overestimates the vitality of Babism and Behaism. His attitude is well set forth in the fourth lecture: "Moral superiority is the true superiority. To understand a people, to understand and to respect its religion, is to have it half won over; this is in every instance the road which leads, by little and little and by successive stages, to comprehension, to prudent administration, to peace and to prosperity." WILLIAM CHURCHILL.

Gut und schlecht Wetter. Von Dr. Richard Hennig. Maps and Illustrations. 118 pp. In series: Aus Natur und Geisteswelt. B. G. Teubner, Leipzig, 1911. M. 1.25. 7 x 5.

A popular exposition of weather facts, chiefly illustrated by many official weather maps, the purpose being to teach the public to read these maps and draw from them correct conclusions. One map, for example, shows, for March 19, 1897, a large area of low atmospheric pressure extending over Scandinavia, the British Isles and western Russia with high barometer over Western Europe, south of the Baltic, with the result that the weather conditions of the western Mediterranean lands were extended, for that day, over western Europe nearly to the Baltic, giving to Germany an unusually early taste of balmy spring weather. Great summer heat in Germany is illustrated by a weather map of July 15, 1907 showing low pressure over the eastern Atlantic and the adjoining coasts and high pressure on the plains of Russia, transferring much of the accumulated heat of the eastern part of Europe to the western lands bordering the sea. Each season of the year is thus represented by maps, covering its various weather phases, with full explanations in the text. The book is simply and clearly written and is well adapted to fulfil its purpose.

GUIDE BOOKS

The Complete Pocket-Guide to Europe. By Edmund C. Stedman. Edited by Thomas L. Stedman. xxxiv and 505 pp., maps and index. William R. Jenkins Co., New York, 1911. 5 x 3½. [New maps and other improvements have been added in this latest revision.]

Paris et ses Environs. Manuel du Voyageur. Par Karl Baedeker. xxvi and 481 pp. 14 maps, 34 plans, index and appendix. 17th Edition. Karl Baedeker, Leipzig, 1911. 6 Mk. 6½ x 4½.

Cook's Tourists' Handbook for Normandy & Brittany. New Edition. viii and 264 pp., maps, index and appendix. Thomas Cook & Sons, London, 1910. 3s. 6½ x 5.

Austria-Hungary, with Excursions to Centinje, Belgrade, and Bucharest. Handbook for Travellers by Karl Baedeker. xii and 602 pp., 71 maps, 77 plans, 2 panoramas, and index. Eleventh edition, revised and augmented. Karl Baedeker, Leipzig, 1911. 10s. 6 x 4. [Contains over thirty new maps and several new plans.]

A Grèce (Guides-Johanne). By Gustave Fougères. lxxxv and 520 pp., 27 maps, 56 plans and 30 illustrations, and tables showing communications between France and Greece. 2e Édition, revue et corrigée. Hachette et Cie, Paris, 1911. 15 Fr. 6 x 4.

Guide du Nil au Jourdain par le Sinai et Pétra. Sur les traces d'Israël. Par Barnabé Meistermann. xlvii and 381 pp., 9 maps, 13 plans of towns and monuments, 72 photo-engravings, illustrations and index. Alphonse Picard et Fils, Paris, 1909. 7 Fr. 6½ x 4½. [Especially for those who wish to follow the route of the Children of Israel between the Nile and the Jordan.]

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

United States

Bailey, E. H. S. Preliminary Report on Stream Pollution by Mine Waters in Southeastern Kansas. Map. *Water Supply Paper* 273, pp. 349-361. U. S. Geol. Surv., 1911.

Bancroft, H. Lead and Zinc Deposits in the Metaline Mining District, Northeastern Washington. Map. Advance Chapter from Contr. to Econ. Geol., 1910. *Bull.* 470–D, pp. 14–21, U. S. Geol. Surv., 1911.

Bolton, H. E. Expedition to San Francisco Bay in 1770. Diary of Pedro Fages. Edited by ——. *Publ. Acad. of Pacific Coast Hist.*, Vol. 2, 1911. 19 pp., Berkeley, Cal.

Bowie, W. Recent Gravity Work in the United States. *Amer. Journ. of Sci.*, Vol. 32, 1911. pp. 101–113.

Cox, G. H. The Origin of the Lead and Zinc Ores of the Upper Mississippi Valley District. *Econ. Geol.*, Vol. 6, 1911. pp 427-448.

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NEW MAPS

Edited by the Assistant Editor

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

Maps issued by United States Government Bureaus

U. S. Geological Survey

Topographic Sheets

Alaska. Copper Mountain and Vicinity (Prince of Wales Island). Surveyed in 1908. 1:62,500 (1 in.=0.99 mile). 55°17′30″ - 55°10′30″ N.; 132°41′ - 132°30′30″ W. Contour interval 100 ft. Alaska Sheet No. 540 B.

California. (a) Gilsizer Slough Quadrangle. (Sutter County). Surveyed in 1909. 1:31,680 (1 in.=0.50 mile). 39°7′30″ - 39°0′ N.; 121°45′ - 121°37′30″ W. Interval 5 ft. Edition of Sept. 1911.

(b) Grimes Quad. Surveyed in 1905 and 1909. 1:31,680. 39°7′30″ - 39°0′ N.; 122°0′ - 121°52′30′ W. Interval 5 ft. Edit. of Aug 1911.

(c) Mills Quad. (Sacramento County). Surveyed in 1908–1909. 1:31,680. 38°37′30″ - 38°30′ N.; 121°22′30″ - 121°15 W. Interval 5 ft. Edit. of Aug. 1911.

(d) Ostrom Quad. Surveyed in 1909. 1:31,680. 39°7′30″ - 39°0′ N.; 121°37′30″ - 121°30′ W. Interval 5 ft Edit. of July 1911.

(e) Sutter Quad. Surveyed in 1909. 1:31,680. 39°15′ - 39°7′30″ N.; 121°45′ - 121°37′30″ W. Interval 5 ft. Edit. of Sept. 1911.

(f) Yuba City Quad. Surveyed in 1909. 1:31,680. 39°15′ - 39°7′30″ N.; 121°37′30″ - 121°30′ W. Interval 5 ft. Edit. of July 1911.

[Belong to the series of half-mile-to-an-inch maps of the Sacramento Valley. Map (f) includes Marysville and Yuba City].

(g) Topographic map of the Sacramento Valley, California. Reduced from U. S. Geological Survey Atlas Sheets. Surveyed in 1903–1910 in cooperation with the State of California. 1:250,000 (1 in.=3.95 miles). 40°15′ - 38°0′ N.; 122°20′ - 121°0′ W. Contour interval 25 ft. 4 colors. With inset: Index to Topographic Maps of Sacramento Valley on scale of 1:31,680 or 2 inches=1 mile. [1:1,250,000 (1 in.=19.7 miles)]. Edit. of Oct. 1911.

[Valuable general map of Sacramento Valley based on the detailed sheets of which maps (a) to (f) are specimens. Symbols for tule marsh and electric power line added to the usual series of conventional signs].

Colorado. De Beque Oil Field. Surveyed in 1910. 1:62,500. 39°29′ - 39°19′ N.; 108°23′ - 108°9.5′ W. Interval 50 ft. Edit. of Sept. 1911.

Idaho-Wyoming-Utah. Montpelier Quad. Surveyed in 1909. 1:125,000. 42°30′ - 42°0′ N.; 111°30′ - 111°0′ W. Interval 50 ft. Edit. of Sept. 1911.

Ohio. (a) Cumberland Quad. Surveyed in 1908–1909. 1:62,500. 40°0′ - 39°45′ N.; 81°45′ - 81°30′ W. Interval 20 ft. Edit of Aug. 1911.

(b) Oxford Quad. Surveyed in 1909. 1:62,500. 39°45′ - 39°30′ N.; 84°45′ - 84°30′ W. Interval 20 ft. Edit. of Aug. 1911.

(c) Spencerville Quad. Surveyed in 1909. 1:62,500. 40°45′ - 40°30′ N.; 84°30′ - 84°15′ W. Interval 10 ft. Edit. of June 1911.

(d) Summerfield Quad. Surveyed in 1909. 1:62,500. 40°0′ - 39°45′ N.; 81°30′ - 81°15′ W. Interval 20 ft. Edit. of Aug. 1911.

Oklahoma. (a) Sallisaw Quad. Surveyed in 1897. Culture revised in 1909. 1:125,000. 35°30′ - 35°0′ N ; 95° - 94°30′ W. Interval 50 ft. Edit. of Sept. 1911.

(b) Sansbois Quad. Surveyed in 1896–97. Culture revised in 1909. 1:125,000. 35°30′ -35°0′ N.; 95°30′ - 95°0′ W. Interval 50 ft. Edit. of Aug. 1911.

Wyoming. Shoshone Quad. Surveyed in 1884-85. Partial revision in 1910. 1:125,000. 44°30′ - 44°0′ N.; 111°0′ - 110°30′ W. Interval 100 ft. Edit. of Sept. 1911.

Maps Accompanying Publications

CALIFORNIA. (a) Topographic Map of Northeastern Part of Chico Quadrangle, California, Showing Drift Mines and Neocene Channels. 1:125,000 (1 in.=1.97 mile). 40°46′ - 40°0′ N.; 121°41′ - 121°30′ W. 2 colors.

(b) Geologic Map of Oroville and Table Mountain, Chico and Marysville Quadrangles, Butte County, California. 1:125,000. 39°41′ - 39°25′ N.; 121°40′ - 121°30′ W. 10 colors.

(c) Map of the Deep Placer Mines near North Bloomfield and Relief, Nevada County, California. After A. D. Gassaway. [1:34,000. (1 in.=0.54 mile)]. [39°32′ N. and 120°54′ W.].

(d) Geologic Map Showing Tertiary Formations and Channels in Parts of Jackson and Big Trees Quadrangles. Geology by H. W. Turner and F. L. Ransome. 1:125,000. 38°10′ - 38°0′ N.; 120°36′ - 120°20′ W. 6 colors.

(e) Geologic Map Showing Tertiary Formations and Channels between St. Andreas and Mokelumne Hill. Geology by F. L. Ransome. Channels outlined by J. M. Boutwell and W. Lindgren. 1:63,360 (1 in.=1.00 mile). 38°18′ - 38°12′ N.; 120°45′ - 120°40′ W. 5 colors.

Pls. XIV, XV, XX, XXVI and XXVII, "The Tertiary Gravels of the Sierra Nevada of California" by W. Lindgren, *Prof. Paper* 73, 1911.

CALIFORNIA-NEVADA. (a) Index map showing location of region of auriferous gravels of the Sierra Nevada. [1 in.=60 miles. (1:380,160)] 41° - 37° N.; 123° - 119° W.

(b) Outline of Tertiary channels and of dislocations along the eastern base of the Sierra Nevada. [1:1,600,000 (1 in =25.3 miles)]. 40½° - 37½° N.; 121¾° - 119° W.

(c) [Geologic] Map of the Northern Part of the Sierra Nevada, California and Nevada. Geology compiled from folios of Geologic Atlas of the United States. Base from U. S. post route maps of California and Nevada. 1:750,000 (1 in.=11.84 miles). 40½° - 37½° N.; 122° - 119° W. 8 colors.

Figs. 1 and 3 and Pl. I, "The Tertiary Gravels of the Sierra Nevada of California" by W. Lindgren, *Prof. Paper* 73, 1911.

[Map (a) an index map showing limits of U. S. G. S. topographic sheets and geologic folios published and limits of map (c).

Map (c) a valuable generalization of the detailed geologic maps of the region.]

MICHIGAN. (a) Geologic Map and [two] Sections of the Marquette Iron-Bearing District, Michigan. Originally prepared by C. R. Van Hise and W. S. Bayley, 1896. Revised to December 1, 1910, to include explorations of Cleveland Cliffs Iron Company, Oliver Iron Mining Company, and geological work of A. E. Seaman and others. 1010. 1:63,360 (1 in.=1.00 mile). [46°34′ - 46°25′ N.; 88°7′ - 87°20′ W.]. 21 colors. With inset of vicinity of Republic forming continuation of main map. Same scale. [46°25′ - 46°22′ N.; 88°2′ - 87°56′ W.].

(b) Map of Carp River Fault, Michigan. By W. N. Smith. 1909. [1 in.=¼ mile (1:15,840)]. [46°27′ N. and 87°25′ W.]. 5 colors.

(c) Detailed Map of Quartzite Ridges of Teal Lake, Michigan, showing faulting and unconformity of Ajibik Quartzite and Mesnard Quartzite. By A. E. Seaman. 1909. [1:8,000 (1 in.=667 ft.)]. [46°30′ N. and 88°35′ W.]. 14 colors.

Pls. XVII, XVIII and XIX, "The Geology of the Lake Superior Region" by C. R. Van Hise and C. K. Leith, *Monograph* 52, 1911.

[On map (a) relief in contours; interval 50 ft]

MICHIGAN. Outcrop Map of Swanzy District, Michigan. Compiled from information furnished by Cleveland-Cliffs Iron Company and others. [1:60,000 (1 in.=0.95 mile)]. [46°20′ N. and 87°25′ W.]. Fig. 41, *Monograph* 52, 1911.

MICHIGAN. Geologic Map of Dead River Area, Michigan. By A. E. Seaman. 1910. 1:62,500 (1 in.=0.99 mile). [46°42′ - 46°32 N.; 87°55′ - 87°31′ W.]. 4 colors. Pl. XX, *Monograph* 52, 1911.

MICHIGAN. (a) Map of Perch Lake District, Showing Distribution of Outcrops. Compiled from commercial surveys (by Van H. Manning). 1:62,500 (1 in.=0.99 mile). 46°30′ - 46°15′ N.; 88°45′ - 88°30′ W. 2 colors.

(b) Geologic map of west end of Marquette district, Michigan. By W. N. Merriam and M. H. Newman. [1:100,000 (1 in.=15.8 miles)]. [46°35′ N. and 88°10′ W.].

Pl. XXI and Fig. 42, *Monograph* 52, 1911.

[Pl. XXI a regular sheet of the topographic map, on which outcrops have been indicated].

MICHIGAN. Geologic Map of the Crystal Falls District, Including Parts of the Felch Mountain and Marquette Districts, Michigan. Corrected to January 1, 1909. 1:125,000 (1 in.=1.97 mile). 46°30′ - 45°59′ N.; 88°30′ - 87°45′ W. 14 colors. Pl. XXII, *Monograph* 52, 1911.

[Geology superimposed on topographic map. Contour interval 40 ft. Topography revised by A. T. Fowler, 1909].

MICHIGAN. Geologic Map of the Calumet District, Michigan. Compiled by C. K. Leith from surveys by W. S. Bayley, R. C. Allen, Edward Steidtmann and others. 1909. 1:90,000 (1 in.=1.42 mile). [45°59′ - 45°54′ N.; 88°7′ - 87°36′ W.]. 8 colors. Pl. XXIII, *Monograph* 52, 1911.

MICHIGAN. Geologic Map of Iron River District, Mich. By R. C. Allen. Topography by U. S. Geol. Surv. with additions to culture by Mich. Geol. Surv. Geology by Geol. Surv. of Mich. 1909. 1:45,000 (1 in.=0.71 mile). 46°15′ - 45°59′ N.; 88°45′ - 88°30′ W. 11 colors. Pl. XXIV, *Monograph* 52, 1911.

MICHIGAN. Geologic Map of Menominee Iron District, Michigan. Revised to January 1, 1909. Topography by E. C. Bebb; surveyed in 1898; culture revised to 1909 by A. T. Fowler. Geology by C. R. Van Hise, W. S. Bayley and J. N. Clements. Surveyed 1896–1899. 1:62,500 (1 in.=0.99 mile). 45°55′ - 45°44′ N.; 88°9′ - 87°44′ W. 14 colors. With three geological sections. Pl. XXVI, *Monograph* 52, 1911.

[Geology superimposed on topographic map; contour interval 20 ft.].

MICHIGAN. (a) Geologic Map of Keweenaw Point Copper District, Michigan. Revised by A. E. Seaman, Michigan College of Mines, 1909. 1:250,000 (1 in.=3.95 miles). [47°30′ - 46°46′ N.; 89°53′ - 87°40′ W.]. 6 colors.

(b) Map Showing Location of Copper-Bearing Lodes and Mines on Keweenaw Point. [1 in.=7 miles (1:443,520)]. [47°35′ - 46°38′ N.; 89°50′ - 87°33′ W.].

Pls. XXVIII and XLIX, *Monograph* 52, 1911.

MICHIGAN-MINNESOTA-WISCONSIN. [Four extracts from U. S. G. S. topographic sheets to illustrate physiography of district:]

(a) Rib Hill, a monadnock rising above the peneplain in Wisconsin. 1:125,000 (1 in.=1.97 mile). 44°55′ N. and 89°40′ W.

(b) Typical monoclinal ridge topography. Isle Royal, Michigan. 1:62,500 (1 in.=0.99 mile). 48°10′ N. and 88°10′ W. 2 colors.

(c) The Duluth escarpment and even upland of peneplain on Duluth gabbro in Minnesota. The spits at Duluth. 1:62,500. 46°47′ N. and 92°6′ W. 2 colors.

(d) Lake shore escarpment of Archean schists and Huronian quartzite near Marquette, Michigan. 1:62,500. 46°33′ N. and 87°25′ W. 2 colors.

Maps (a) and (b), Pl. IV, maps (c) and (d), Pl. V, *Monograph* 52, 1911.

MICHIGAN-WISCONSIN. Sketch map to show general relations of iron-bearing rocks, principally upper Huronian, in Crystal Falls, Iron River, Florence and Menominee districts. [1 in.=12 miles (1:760,320)]. [46°25′ - 45°45′ N.; 89°0′ - 87°20′ W.]. Fig. 43, *Monograph* 52, 1911.

MINNESOTA. (a) The drainage of the St. Louis and Mississippi headwaters before the stream captures along the Duluth escarpment. [1:1,900,000 (1 in.=30.0 miles)]. [47°30′ - 46°25′ N.; 94°0′ - 91°30′ W.].

(b) The drainage of the St. Louis and Mississippi headwaters at present, after stream captures and diversions. Same scale and co-ordinates as map (a).

Figs. 9 and 10, *Monograph* 52, 1911.

MINNESOTA. Geologic Map of the Vermilion Iron-Bearing District, Minnesota. C. R. Van Hise, Geologist in charge. Detailed geology by J. Morgan Clements, W. S. Bayley and C. K. Leith. Field work ended in October, 1900. Revised to January 1, 1910. 1:125,000 (1 in.=1.97 mile). Oriented N. 15° E. 48°15′ - 47°45′ N.; 92°30′ - 90°42′ W. Pl. VI, *Monograph* 52, 1911.

MINNESOTA. Geologic Map of the Mesabi District, Minnesota. By C. K. Leith. (Corrected to January 1, 1911). 1:62,500 (1 in.=0.99 mile). Oriented N. 21° E. 47°45′ - 47°5′ N.; 93°50′ - 91°47′ W. 11 colors. With three sections. Pl. VIII, *Monograph* 52, 1911.

[Relief shown in brown contours; interval 20 ft.].

MINNESOTA. Geologic Map of Pigeon Point, Minnesota. By W. S. Bayley, 1890. Topography from U. S. Lake Survey. Contour interval 20 ft. 1910. With two sections. 1:22,500 (1 in.=0.35 mile). [48°0′ N. and 89°35′ W.]. 9 colors. Pl. XII, *Monograph* 52, 1911.

MINNESOTA. (a) Map of Central Minnesota, Including Cuyuna District. Compiled by C. K. Leith from map by C. W. Hall and commercial surveys of the Cuyuna district by Carl Zappfe and others. 1910. 1:1,250,000 (1 in.=19.73 miles). [46°55′ - 45°20′ N.; 95°10′ - 92°0′ W.]. 5 colors.

(b) Map of Part of the Cuyuna Iron District of Minnesota. Compiled by C. K. Leith and Carl Zappfe from commercial surveys. Corrected to April 1, 1910. 1:125,000 (1 in.=1.97 mile). Oriented N. 30° E. [46°40′ - 46°10′ N.; 94°20′ - 93°50′ W.].

Pls XIV and XV, *Monograph* 52, 1911.

MINNESOTA-WISCONSIN. (a) St. Louis River at the stage when it cut its valley and emptied directly into Lake Nipissing. [1:183,000 (1 in.=2.9 miles)]. [46°50′ - 46°35′ N.; 92°25′ - 91°52′ W.].

(b) The present St. Louis River which has been converted into an estuary by post-Nipissing tilting. Same scale and co-ordinates as map (a).

Figs. 69 and 70, *Monograph* 52, 1911.

New Mexico. Geologic Map of the Vicinity of the Burro Mountains, Grant County, N. Mex. [1 in.=2 miles (1:126,720)]. 32°45′ - 32°30′ N.; 108°28′ - 108°18′ W.
Pl. IV, "Metalliferous Ore Deposits near the Burro Mountains, Grant County, New Mexico" by S. Paige, *Bull.* 470-C, 1911, pp. 3-22.

Ontario. Geologic Map of the Animikie Iron-Bearing District, North of Thunder Bay, Ontario. By W. N. Smith and R. C. Allen. [1:85,000 (1 in.=1.3 mile)]. [48°37′ N. and 88°47′ W.].
Pl. XIII, "The Geology of the Lake Superior Region" by C. R. Van Hise and C. K. Leith, *Monograph* 52, 1911.

United States–Canada. (a) Sketch map of Lake Superior region, showing iron districts, shipping ports and transportation lines. [1:6,300,000 (1 in.=99.4 miles)]. [49½° - 43° N.; 95½° - 83° W.].
(b) Relief Map of the Lake Superior Region, Showing the Larger Topographic Features. 1 in. =about 60 miles (1:3,800,000). [49½° - 44° N.; 95° - 84° W.].
(c) Generalized topographic map of the Lake Superior region. [1:5,700,000 (1 in.=90.0 miles)]. [49° - 44° N.; 95° - 84° W.].
(d) The topographic provinces of the Lake Superior region, with some subdivisions of the peneplain. Same scale and co-ordinates as map (c).
(e) Map of Lake Superior basin, designed to show the structure and extent of the Keweenawan trough. (After Irving, R. D, *Mon.* U. S. Geol. Survey, Vol. 5, 1883, Pl. XXVIII). [1 in.=50 miles (1:3,168,000)]. [49°10′ and 45°20′ N.; 93°0′ - 84°30′ W.].
(f) Geologic Map of the Lake Superior Region, with [two] Sections. 1910. Base compiled . . . from U. S. Geological Survey atlas sheets, Land Office records, compilations by State Geological Surveys, official maps of Canada and other data. Geology compiled by C. R. Van Hise and C. K. Leith. 1:1,000,000 (1 in.=15.78 miles). Same coordinates as map (c). 25 colors.
Fig. 2, Pl. II, Figs. 4, 5 and 59, and Pl. I, "The Geology of the Lake Superior Region by C. R. Van Hise and C. K. Leith, *Monograph* 52, 1911.
[The "Lake Superior region" comprises the ore-bearing districts scattered around Lake Superior. For the purposes of the monograph and on the above maps it is bounded by the conventional limits of 49° and 44° N. and 95° and 84° W..
Pl. II is a photograph of a model. Fig. 4 shows 580, 1,000 and 1,700 ft. contours and Mississippi-St. Lawrence-Hudson Bay divides. Fig. 5 distinguishes between peneplain, monoclinal ridges, monadnocks, mesas.
Pl. I is a fundamental geologic map of the region].

United States–Canada. [Seven maps illustrating the Pleistocene geology of the Lake Superior region. (49° - 44° N.; 95° - 84° W.). (1:5,700,000 [1 in.=90.0 miles)]:]
(a) Sketch map showing the glaciation of the Lake Superior region, giving names of lobes and probable directions of ice flow. (b) Glacial Lake Nemadji. (c) Glacial Lake Duluth. (d) Hypothetical intermediate stage with the expansion of glacial Lake Chicago and the later stage of glacial Lake Agassiz near the northwest corner. (e) Glacial Lake Algonquin. (f) Part of Nipissing Great Lakes. (g) Sketch map showing Driftless Area and regions of older drift, last drift and lake deposits.
Figs. 60, 63, 64, 65, 66, 67 and 68, "The Geology of the Lake Superior Region" by C. R. Van Hise and C. K. Leith, *Monograph* 52, 1911.

Wisconsin. Sketch map showing Baraboo, Fox River valley, Necedah, Waushara and Waterloo pre-Cambrian areas of south-central Wisconsin. [1:900,000 (1 in.=14.2 miles)]. [44°5′ - 43°5′ N.; 90°6′ - 88°46′ W.]. Fig. 53, *Monograph* 52, 1911.

Wisconsin. Outcrop Map of the Florence Iron District, Wisconsin. From map by W. N. Merriam, 1904, partly revised by W. O. Hotchkiss, 1910. 1:62,500 (1 in.=0.99 mile). [45°59′ - 45°30′ N.; 88°24′ - 88°4′ W.]. 6 colors. Pl. XXV, *Monograph* 52, 1911.

Wisconsin-Michigan. Geologic Map of the Penokee-Gogebic District. By C. R. Van Hise and R. D. Irving. (Revised to January 1, 1909). 1:90,000 (1 in.=1.42 mile). Oriented N. 8° E. 46°31′ - 46°14′ N.; 9°7′ - 89°30′ W. 13 colors. Pl. XVI, *Monograph* 52, 1911.
[Relief in contours; interval 20 ft.].

Wisconsin-Michigan-Minnesota. Four maps to illustrate glaciation of district: three, extracts from U. S. G. S. topographic sheets; and one, extract from chart of Lake Survey:]
(a) Terminal Moraine and Outwash Plain Topography in Glaciated Area of Western Wisconsin. 1:62,500 (1 in.=0.99 mile). 45°25′ N. and 92°35′ W. 2 colors.
(b) Glaciated Valley of Portage Lake on Keweenaw Point in Michigan, with hanging valley of Huron Creek. 1:30,000 (1 in.=0.47 mile). 47°8′ N. and 88°34′ W. 2 colors.
(c) Characteristic Driftless Area Topography in Northern Wisconsin, showing normal mature drainage. 1:125,000 (1 in.=1.97 mile). 44°50′ N. and 89°50′ W. 2 colors.
(d) Characteristic Muskeg and Ground Moraine Topography in Glaciated Area of Minnesota, showing post-Glacial young drainage. 1:62,500. 45°12′ N. and 93°10′ W. 2 colors.
Maps (a) and (b), Pl. XXX, maps (c) and (d), Pl. XXXI, *Monograph* 52, 1911.

U. S. Lake Survey

Michigan. Grays Reef Passage, Lake Michigan, Showing New Shoal and Amended Sailing Courses. Surveyed under the direction of Lieut. Col. C. S. Riché, Corps of Engineers, U. S. Army, October 30, 1911. 1:80,000 (1 in.=1.26 mile). 45°51′ - 45°40′ N.; 85°15′ - 85°4′ W. 1 color. Accompanies note with similar title, *Suppl.* No. 7 to *Bull.* No. 20, Survey of N. and N. W. Lakes, 1911, pp. 12–13.

Bureau of American Ethnology

Nebraska. Title Map. Omaha Reservation, Thurston County, Nebraska. By H. L. Keefe. [1:550,000 (1 in.=8.7 miles)]. [42°12′ - 42°0′ N.; 96°45′ - 96°12′ W.]. Pl. 65, "The Omaha Tribe" by A. C. Fletcher and F. La Flesche, *27th Annual Report Bur. Amer. Ethnol.*, 1911, pp. 15-654.

Nebraska–Kansas–Iowa–Missouri, etc. Country Known to the Omaha. [1:5,000,000 (1 in.= 78.99 miles)]. 46° - 36½° N.; 105½° - 88½° W. Pl. 21, "The Omaha Tribe" by A. C. Fletcher and F. La Flesche, *27th Annual Report Bur. Amer. Ethnol.*, 1911, pp. 15–654.
[Shows extent of country known to the Omaha, also Omaha villages and principal Indian battlefields].

NORTH AMERICA

Mexico. Karte der Bevölkerungsdichte der Republik Mexiko. Von Dr. E. Wittich. 1:20,000,000 (1 in.=315.65 miles). 33° - 13° N.; 117° - 86° W. Accompanies "Die Volkszählung in der Republik Mexiko im Jahre 1910" by E. Wittich, *Pet. Mitt.*, Vol. 57, II, 1911, pp. 191–194.

SOUTH AMERICA

Bolivia. (a) Skizze der Umgebung des Chorolque. 1:200,000 (1 in.=3.16 miles). 21°10′ S. and 66°08′ W.

(b) Umgegend von La Paz. (Flusssystem). [1:1,500,000 (1 in.=23.7 miles)]. 16°0′ - 16°50′ S.; 68°45′ - 67°35′ W.

Skizzen 1 and 2 on pp. 50 and 94, "Reisen in Bolivien und Peru" by R. Hauthal, *Wiss. Veröffentl. Gesell. f. Erdk. zu Leipzig*, Vol. 7, 1911.

Bolivia Argentina-Chile-Peru. Reiseroute von Prof. Dr. R. Hauthal (Oktober 1907 bis März 1908). [1:11,000,000 (1 in.=173.61 miles). Scale incorrectly given as 1:1,100,000]. 9° - 29° S.; 78° - 63° W. 3 colors. Accompanies "Reisen in Bolivien und Peru" by R. Hauthal. *Wiss. Veröffentl. Gesell. f. Erdk. zu Leipzig*, Vol. 7, 1911.

Brazil. Völkerkarte des Gebietes am oberen Rio Negro und Yapurá mit besonderer Berücksichtigung der Aruakstamme. Entworfen von Dr. Theodor Koch-Grünberg. 1:3,000,000 (1 in.=47.34 miles). 2 3/5° N. - 2° S.; 71½° - 66 3/5° W. 4 colors. Accompanies "Aruak-Sprachen Nordwestbrasiliens und der angrenzenden Gebiete" (first part) by T. Koch-Grünberg, *Mitt. Anthropol. Gesell. in Wien*, Vol. 31, 1911, pp. 33–153.

Peru. Gebiet von Oroya [1:1,500,000 (1 in.=23.7 miles)]. 11°15′ - 12°0′ S.; 76°15′ - 75°40′ W.]. Skizze 3 on p. 149 in "Reisen in Bolivien und Peru" by R. Hauthal, *Wiss. Veröffentl. Gesell. f. Erdk. zu Leipzig*, Vol. 7, 1911.

AFRICA

Africa. Africa, showing the Progress of Exploration. 1:20,000,000, or 1 in.=315.65 miles. 37° N. - 35° S.; 20° W. - 60° E. 5 colors. Accompanies "Problems in Exploration: Africa" by F. R. Cana, *Geogr. Journ.*, Vol. 38, 1911, pp. 457–469.

[An excellent map showing the present (1911) state of our knowledge of the continent. It distinguishes between areas mapped (1) from systematic surveys, (2) from less reliable surveys including good route traverses, (3) from rough route traverses, (4) principally from native report and (5) areas entirely unknown. It is an admirable solution of the fundamental problem, difficult, however, because of its comprehensiveness, of summarizing our knowledge of a given area of the earth's surface].

British East Africa. (a) Map of Suk Country. Reproduced . . . from the Official War Office maps (Africa, 1:1.000,000, sheets 86 and 87). [1:500,000 (1 in.=7.89 miles)]. Oriented N. 37° E. 2°34′ - 0°17′ N.; 35°0′ - 36°38′ E.

(b) Baringo District Showing Tribal Division. [1:2,100,000 (1 in.=33 1 miles)]. 3½° - 1/5° N.; 35° - 37° E.

(c) Kerio Suk Country. [1:365,000 (1 in.=5.8 miles)]. 2° - 1° N.; 35⅛° - 36° E.

Accompany "The Suk: Their Language and Folklore" by M. W. H. Beech, Oxford, 1911.

[Maps (a) and (c), especially the latter, embody valuable original material On maps (a) and (b) the ethnic boundary of the Suk country is shown. On maps (a) and (c) relief is shown in sketch contours].

German East Africa-Belgian Congo-British East Africa. Die neue deutsch-belgische Grenze im Kiwu-Gebiet. [1:1,700,000 (1 in.=26 8 miles)]. 0°50′ - 3°40′ S.; 28°40′ - 32°12′ E. Accompanies "Das neue Grenzabkommen zwischen Deutschland und Belgisch-Kongo im Kiwusee-Gebiet" by M. Moisel, *Deutsche Kolonialzeitung*, Vol. 28, 1911, pp. 607–608.

Northeastern Africa. (a) Map Showing Meteorological, River and Rain Gauge Stations [in the Nile Basin]. 1:7,500,000, or 1 in.=118.37 miles. 33° N. - 5° S.; 21° - 41° E. 1 color. With inset: [The Nile Delta]. [1:3,000,000 approx. (1 in.=47.3 miles approx.)]. 31°45′ - 29°55′ N.; 29°44′ - 32°24′ E. 1 color.

(b) [Four maps of northeastern Africa showing:] Normal Rainfall of June, July, August and September. 1:50,000,000 (1 in.=789.13 miles). 43° N. - 6° S.; 20° - 63° E. 1 color.

Pls. I and IX, "The Rains of the Nile Basin and the Nile Flood of 1909" by J. I. Craig. *Survey Dept.* [of Egypt] *Paper* No. 17, Cairo, 1910.

[Map (b) shows isohyetals in inches].

Madagascar. Bassin inférieur de la Mamba. No scale. [18°50′ S. and 47°23′ E.]. Accompanies "Note sur les bassins réservoirs de la vallée inférieure de la Mamba, affluent de l'Ikopa (province de Tananarive)" by G. Carle, *Bull. Écon., Colon. de Madagascar & Dépendances*, Vol. 10, 1910, pp. 169–173.

Madagascar. Les mines d'or d'Andavakoera (Madagascar). [1:300,000 (1 in.=4.73 miles)]. [13°10′ S. and 49°20′ E.] 1 color. With geological section. Accompanies "Les mines d'or de la région d'Andavakoera (Nord de Madagascar)" by A. Bordeaux, *Bull. Écon., Colon. de Madagascar & Dépendances*, Vol. 10, 1910, pp. 187–198.

Madagascar. Esquisse d'une Carte Tectonique de l'Ouest [of Madagascar]. 1:3,500,000 (1 in.= 55.24 miles). [11° - 26° S.; 42° - 52° E.]. 8 colors. Accompanies "Notes sur la vallée permo-triasique et le contact des terrains métamorphiques et des terrains sédimentaires dans l'Ouest de Madagascar" by P. de la Bathie, *Bull. Écon., Colon. de Madagascar & Dépendances*, Vol. 10, 1910, pp. 199–235.

[Shows, on a map of the whole of Madagascar, the escarpments formed by the western border of the Archean nucleus of the center of the island and by the eastern border of the sedimentary formations of its western slope].

Morocco. Schematische Darstellung der Hauptübergänge über den westlichen Hohen Atlas. 1:2,000,000 (1 in.=31.57 miles). 31°40′ - 30°20′ N.; 9°55′ - 6°35′ W. Accompanies paper with similar title by Hübner, *Pet. Mitt.*, Vol. 57, II, 1911, pp. 237–240.

Tripoli. Sketch map of Tripoli and Its Dependencies. 1:15,000,000, or 1 in.=236.74 miles. 35° - 22° N.; 8° - 26° E. Accompanies "Tripoli" by A. Vischer, *Geogr. Journ.*, Vol. 38, 1911, pp. 487-494.

[Critical map showing essential features].

ASIA.

British India. Burma (Upper and Lower). From a tracing by the Geographical Society, founded on a map published by the Survey of India, with recent additions by Sir George Scott. With inset forming S. E. continuation of main map. [1:10,000,000 (1 in.=157.8 miles)]. Coordinates including inset: 28° - 10° N.; 91° - 102° E. Accompanies "Burma: A Handbook of Practical Information" (2nd edition) by J. G. Scott, London, 1911.

[Gives boundaries and names of districts].

China. Carte Provisoire du Yang Tseu Kiang Supérieur et du Cours Inférieur du Ya Long. Levée par le Capitaine de frégate Audemard, Mars-Juin 1910. Exploration du Comte Ch. de Polignac. 1:1,000.000 (1 in.=15.78 miles). 29° - 25 3/5° N.; 99¾° - 105° E. 2 colors. With inset showing location of main map: 1:20,000,000 (1 in.=315.6 miles). 42° - 18° N.; 90° - 125° E. 2 colors. Pl. I, "Exploration hydrographique du Ya-long et du Yang-tseu supérieur" by L. Audemard, *La Géogr.*, Vol. 24, 1911, pp. 1-30.

China. Map Showing Itinerary of Edwin J. Dingle's Travels in the Chinese Empire, 1909-10. [1:7,000,000 (1 in.=110.5 miles)]. 32° - 20½° N.; 95½° - 123½° E. 1 color. With inset: "Rough Outline of Author's Travels in Far East. [1:80,000,000 approx. (1 in.=1262.6 miles approx.)] 1 color. Accompanies "Across China on Foot" by E. J. Dingle, New York, 1911.

Japan. Geological Map of the Echigo Oil Field. 1:200,000 (1 in.=3.16 miles). [38°0′ - 36°50 N.. 138°0′ - 139°12′ E.] 13 colors. With inset: Distribution of Petroleum in Japan, 1:10,000,000 (1 in.=157.83 miles), and four geological sections. Accompanies "Preliminary Note on the Geology of the Echigo Oil Field" by T. Iki, *Memoirs Imp. Geol. Surv. of Japan*, No. 2, 1910, pp. 29-57.

Japan. (a) [Fourteen maps of harbors equipped with tidal observatories, accompanying "Results of the Harmonic Analysis of Tidal Observations made at Various Ports of Japan" by S. Hirayama, *Journ. Coll. Sci.*, Imp. Univ. Tokyo, Vol. 28, Art. 7, April 1911:]

(1) Takaw (Formosa). [1:4,800 (1 in.=400 ft.)]. 22°36′52″ - 22°36′20″ N.; 120°16′0″ - 120°16′23″ E. Pl. II.

(2) Kiirun (Formosa). [1:27,000 (1 in.=0.43 mile)]. 25°10.5′ - 25°7.6′ N.; 121°44.0′ - 121°46.3′ E. Pl. IV.

(3) Fukabori (Kiushiu). [1:43,000 (1 in.=0.68 mile)]. 32°43.3′ - 32°39.0′ N.; 129°47.0′ - 129°50.7′ E. Pl. VI.

(4) Hosojima (Kiushiu). [1:22,000 (1 in.=0.35 mile)]. 32°26.4′ - 32°24.9′; 131°39.0′ - 131°41.9′ E. Pl. VIII.

(5) Tonoura (Honshiu). [1:10,000 (1 in.=0.16 mile)]. 34°55′7″ - 34°54′3″ N.; 132°3′48″ - 132°4′45″ E. Pl. X.

(6) Kobe (Honshiu). [1:25,000 (1 in.=0.39 mile)]. 34°42.0′ - 34°39.3′ N.; 135°10.3′ - 135°12.6′ E. Pl. XII.

(7) Kushimoto (Honshiu). [1:37,000 (1 in.=0.58 mile)]. 33°29.5′ - 33°25.4′ N.; 135°44.4′ - 135°47.9′ E. Pl. XIV.

(8) Wajima (Honshiu). [1:25,000]. 37°25.3′ - 37°23.3′ N.; 136°52.2′ - 136°55.3′ E. Pl. XVI.

(9) Aburatsubo (Honshiu). [1:13,000 (1 in.=0.21 mile)]. 35°10.3′ - 35°9.0′ N.; 139°36.4′ - 139°37.7′ E. Pl. XVIII.

(10) Yokohama. [1:38,000 (1 in.=0.76 mile)]. 35°29.7′ - 35°25.5′ N.; 139°36.7′ - 139°40.3′ E. Pl. XX.

(11) Iwasaki (Honshiu). [1:20,000 (1 in.=0.32 mile)]. 40°35.5′ - 40°34.0′ N.; 139°53.6′ - 139°56.3′ E. Pl. XXI.

(12) Ayukawa (Honshiu). [1:77,000 (1 in.=1.22 mile)]. 38°21.6′ - 38°13.1′ N.; 141°27.7′ - 141°35.0′ E. Pl. XXIII.

(13) Otaru (Hokkaido). [1:25,000]. 43°13.9′ - 43°11.2′ N.; 140°59.3′ - 141°1.9′ E. Pl. XXV.

(14) Hanasaki (Hokkaido). [1:44,000 (1 in.=0.69 mile)]. 43°17.8′ - 43°13.0′ N.; 145°32 7 - 145°37.3′ E. Pl. XXVII.

(b) [Outline map of Japan showing location of above harbors]. [1:5,400,000 (1 in.=85.2 miles)]. Pl. I.

[On maps listed under (a) soundings given and relief shown in contours].

Turkey in Asia. Zweite Reise in der Asiatischen Türkei 1899 von Dr. Max Freiherrn v. Oppenheim.

(a) Blatt II. Von Haleb nach Orfa . . . und Aïn-tāb. 1:600,000 (1 in.=9.47 miles). 37°55′ - 36°10′ N.; 36°53′ - 41°7′ E. 3 colors. With inset: Orfa und Umgebung. 1:300,000 (1 in.=4.73 miles). 37°20′ - 37°5′ N.; 38°44′ - 39°15′ E. 2 colors.

(b) Blatt III: Westlich von Aintab über Adanā und Eregli nach Koniah. 1:600,000. 37°55′ - 36°10′ N.; 32°30′ - 36°50′ E. 3 colors. With inset: Ubersicht der Reisewege Dr. Max Frhrn v. Oppenheim's in Syrien und Klein-asien 1899. 1:3,700,000 (1 in.=58.39 miles). 38°10′ - 33°20′ N.; 33°7′ - 41°15′ E. 3 colors.

Taf 18 and 23, *Pet. Mitt.*, Vol. 57, II, 1911.

[Inset on map (b) an index map showing location of the large-scale sheets. Sheet I listed in *Bull.*, Vol. 43, 1911, p. 798].

AUSTRALASIA AND OCEANIA.

Bismarck Archipelago. [Skizze der Blanche-Bucht (Neupommern) mit den Vulkanen Ghaie und Raluan]. 1:200,000 (1 in.=3.16 miles). 4°10′ S. and 152°1[illegible]′ E. Accompanies "Die Tätigkeit der Vulkane Ghaie und Raluan (Neupommern)" by K Sapper, *Pet. Mitt.*, Vol. 57, II, 1911, pp. 135-139.

Kaiser Wilhelms Land. Karte der Durchquerung des Hinterlandes von Finschhafen (Kaiser-Wilhelms Land) durch die Missionare G. Pilhofer und Flierl und Architekt H. Meier 1:400,000 (1 in =6.31 miles). 6°8′ - 5°4′ N.; 146°53′ - 148°2′ E. 3 colors. Taf. 24, "Eine Reise in das Hinterland von Finschhafen (Kaiser-Wilhelms Land)" by G. Pilhofer, *Pet. Mitt.*, Vol. 57, II, 1911, pp. 187-191.

Papua. Central Papua, New Guinea. Route and Explorations of the Expedition of D. Mackay and W. S. Little. 1908–9. 1:500,000, or 1 in.=7.89 miles. 6°42′ - 8°0′ S.; 143°30′ - 145°25′ E. 3 colors. With inset showing location of main map. 1:10,000,000, or 1 in.=157.83 miles. 2° - 12° S.; 140° - 151½° E. 3 colors. Accompanies "The Mackay-Little Expedition in Southern New Guinea," *Geogr. Journ.*, Vol. 38, 1911, pp. 483–487.

[Additional material for filling up the continually decreasing blank areas on the map of New Guinea.]

EUROPE

Austria-Hungary. (a) Sketch of Neighbourhood of Kerka Falls, Dalmatia. [1:121,000 (1 in.=1.9 mile). Scale incorrectly given as 1:37,500]. [43°55′ - 43°45′ N.; 15°50′ - 16°5′ E.].

(b) Sketch Map of Neighbourhood of Topolje Falls [1:42,500 (1 in.=0.67 mile). Scale incorrectly given]. [44°3′ N. and 16°14′ E.].

(c) Plan of Topolje Falls [1:4,100 (1 in.=342 ft.)]. Same coordinates as map (b).

(d) Sketch Map of Neighbourhood of Pliva Falls, Bosnia. [1:110,000 (1 in.=1.7 mile)]. [44°23′ - 44°18′ N.; 17°7′ - 17°18′ E.].

Figs. 1, 2, 3 and 4, "Constructive Waterfalls" by J. W. Gregory, *Scott. Geogr. Mag.*, Vol. 27, 1911, pp. 537–546.

Austria-Hungary. Strategische Eisenbahnen und Eisenbahnpläne in Bosnien und in der Herzegowina. 1:3,700,000 (1 in.=58.39 miles). 46°0′ - 42°10′ N.; 14°20′ - 19°50′ E. Accompanies note with similar title by O. Kreutzbruck v. Lilienfels, *Pet. Mitt.*, Vol. 57, II, 1911, pp. 173–174.

[Distinguishes between standard and narrow gage railroads, projected and in operation].

Austria-Hungary. Lignes de fracture dans la partie occidentale du grand bassin hongrois, d'après de Lóczy. [1:1,400,000 (1 in.=22.1 miles)]. [47°3′ - 46°34′ N.; 17°8′ - 19°20′ E.]. Fig. 5, "Les lignes de fracture de la croûte terrestre" by A. Pécsi, *La Géogr.*, Vol. 24, 1911, pp. 31–40.

Austria-Hungary. Umgebungskarte von Drosendorf [showing location of paleolithic and neolithic settlements]. 1:56,000 (1 in.=0.88 mile). [48°52′ N. and 15°38′ E.]. Accompanies "Das Plateaulehm-Paläolithikum des nordöstlichen Waldviertels von Niederösterreich" by F. Kiessling and H. Obermaier, *Mitt. Anthropol. Gesell. in Wien*, Vol. 31, 1911, pp. 1–32.

Bulgaria. [Two maps:] Bevölkerungsdichte in Bulgarien. Entworfen von Prof. Dr. C. Kassner. 1:3,000,000 (1 in.=47.34 miles). 5 colors. (a) 1887. (b) 1905. Taf. 17, "Die Bevölkerung in Bulgarien und ihre Siedlungsverhältnisse" by A. Ischirkoff, translated by A. Kassner, *Pet. Mitt.*, Vol. 57, II, 1911, pp. 117–122 and 179–185.

[Ungeneralized map showing density of population by administrative districts. Six degrees of areal and eight of urban density shown.]

Germany. Deutsche Ansiedlung in der Ostmark nach dem Stande vom 1. Januar 1911. 1:1,500,000 (1 in.=23.67 miles). 55° - 51° N.; 15° - 20° E. 3 colors. Sonderbeilage 63, *Geogr. Anzeiger*, Vol. 12, 1911.

[Distinguishes between areas in which more than half of the inhabitants are Poles and those in which more than half are Germans. Shows the estates bought by the "Ansiedlungskommission" for purposes of German colonization.]

Great Britain and Ireland. The Old Course of the Solent. [1:1,800,000 (1 in.=28.4 miles)]. [51½° - 50¼° N.; 3° W. - 0°.]. Accompanies "Geography at the British Association, Portsmouth Meeting, 1911" by A. J. Herbertson, *Geogr. Journ.*, Vol. 38, 1911, pp. 504-514.

The Netherlands. [Map of the northern Netherlands showing the plan adopted for the reclamation of the Zuyder Zee]. [1:1,600,000 (1 in.=25.3 miles)]. [53°40′ - 52°0′ N.; 4°10′ - 6°45′ E.]. Accompanies "Einfluss der Abschliessung der Zuidersee auf die Flutgrösse ausserhalb der Abschliessung" by A. v. Horn, *Ann. Hydrogr. u. Marit. Meteorol.*, Vol. 39, 1911, pp. 485–488.

Switzerland—France. (a) Hydrographie du Bassin de Genève. [1:300,000 (1 in =4.73 miles)]. [46°23′ - 46°3′ N.; 5°50′ - 6°12′ E.].

(b) Capture de Theiry. [1:50,000 (1 in.=0.79 mile)]. [46°8′ and 6°4′ E.].

Figs. 9 and 10, "Un cas de capture aux environs de Genève" by C. Rabot, *La Géogr.*, Vol. 24, 1911, pp. 44–46. (Reproduced from *Archives des Sciences phys. et nat. de Genève.*)

WORLD AND LARGER PARTS

World. Funkentelegraphenkarten. III. Weltkarte. Nach amtlichen Quellen und privaten Ermittelungen. [Van der Grinten's Projection:] equatorial scale 1:40,000,000 (1 in.=631.30 miles). 84° N. - 53° S.; 150° E. - 130° W. 2 colors. Accompanies, as Taf. 28, note by L., *Pet. Mitt.*, Vol. 57, II, 1911, p. 240.

[Valuable map showing location of wireless telegraphy stations and their range of call. Distinguishes between public and government stations. Maps I (Western Europe) and II (North America) were published as Taf. 10 and 20 in *Pet. Mitt.*, Vol. 57, I, 1911].

OCEANOGRAPHICAL

North Atlantic Ocean. Reiseweg und Lotungen der Deutschen Antarktischen Expedition zwischen den Azoren und Pernambuco. [Mercator's Projection: equatorial scale 1:30,000,000]. 40° N. - 10° S.; 50° - 20° W. Taf. 25, "Ozeanographische Arbeiten der Deutschen Antarktischen Expedition, II. Bericht" by W. Brennecke, *Ann. Hydrogr. u. Marit. Meteorol.*, Vol. 39, 1911, pp. 464–471.

HISTORICAL

Brazil. [Sections from three maps showing the mouth of the Amazon:] (1) Egerton Map. (2) Juan de la Cosa [Map]. (3) Diego Ribeiro [Map] [1529]. Accompany "The Egerton Map of Early American Discoveries" by O. A. Derby, *Geogr. Journ.*, Vol. 38, 1911, pp. 494-504.

CARTOGRAPHICAL

France. Index Diagram Showing for France the Sheet Lines of the Air Map. [1:11,400,000 (1 in.=179.9 miles)]. 52° - 42° N.; 5° W. - 8° E. Fig. 1, "International Air Map and Aeronautical Marks" by C. Lallemand, *Geogr. Journ.*, Vol. 38, 1911, pp. 469–483.

BULLETIN

OF THE

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Vol. XLIV 1912 No. 2

THE FORESTS OF THE PHILIPPINES

BY

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University of Chicago

The frontiers of science have been extended in many ways by earnest workers in the Philippines, since America took charge of the government there. When one reflects that peace has been established only a dozen years, that the various lines of scientific work have been developed with only moderate appropriations, and that, in many lines, men have had to be trained to the special problems on the ground, it is marvelous what progress has been made.

The study of the forests in the islands, as a commercial asset, has been undertaken by the Forestry Bureau. The director of the Bureau, Major George P. Ahern, has not only made a rapid and effective survey of the commercial forest resource, but he has also had the wisdom to associate with himself young men of the highest scientific training and ability, and has thus made the study of the forest resource yield at the same time scientific studies of high value. The latest bulletin* is an example of this double purpose adequately served. Dr. Whitford has spent years cruising the forests, making careful estimates of the quantity, quality and availability of the merchantable timber. But at the same time he has gone with the point of view, and the note book of the trained botanist and ecologist, and his report is a splendid example of a scientific contribution, put in non-technical language, equally available for the business man interested in the lumber industry, and for the geographer and botanist wherever he may be.

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* Whitford, H. N. The Forests of the Philippines. Part I, Forest Types and Products, pp. 94. Plates 28, map. Part II, The Principal Forest Trees, pp. 113. Plates 103. *Bull.* 10 of the Philippine Bureau of Forestry, Manila, 1911. $1.25, post free.

The statement here made of the forest resource of the Islands is somewhat startling, and very instructive. Dr. Whitford publishes a map of the archipelago (Fig. 1), showing that of the total area of something over 120,000 square miles, one third, or 40,000 square miles, is in the natural untouched forest primeval, an area about the size of Kentucky; 20,000 square miles more are in second growth; 48,000 square miles are in grass land; and only 12,000 square miles are under cultivation. Of this latter figure, small as it is, a footnote calls attention to the fact that not over 6,000 square miles is under cultivation at any one time. The cultivated areas are mostly small

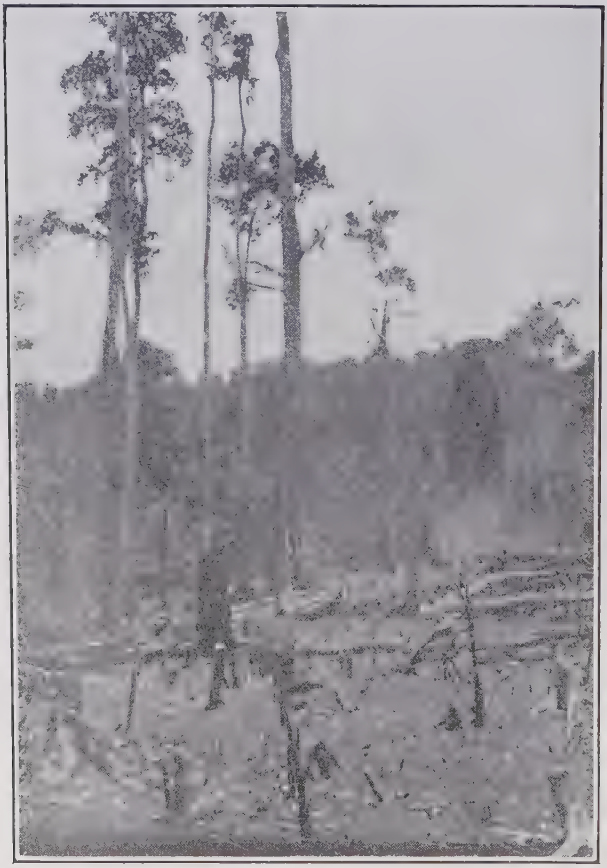

Fig. 2—A caingin area in Mindoro.

and widely scattered. It is a good deal of a surprise to know that the entire population of about 8,000,000 is supported by the cultivation of only about 5 per cent of the total area.

It is reasonably certain that the entire surface of the land was originally covered with forest growth of some kind. But caingin making, a primitive method of agriculture, has destroyed over half of the original cover. This method of agriculture, common in the tropics, is as follows: A patch of forest is partly cut and the felled stuff allowed to dry, and then burned.* Into this partly cleared area crops of rice, sweet potatoes, corn and the like are planted. By the time one or two crops have been taken from the patch, the cogon grass has come in. Its roots make such a network, and it grows so fast and so rank, that it is extremely difficult, with primitive implements, to win a crop in competition with it. So the patch is abandoned, and the easier task of destroying another area of forest is begun again. The cogon grass, in the dry season, burns very easily, and the constant burning keeps down every ambitious forest seedling, though it does not injure the grass. The grass is so coarse as to be nearly worthless as forage, and, as a consequence, very large areas, nearly half the land surface, lie idle and mostly worthless. If the *cogonales* could be kept free from fire, the forest would come back, ultimately to the original form, with a forest covering determined by the factors of climate, soil and exposure.

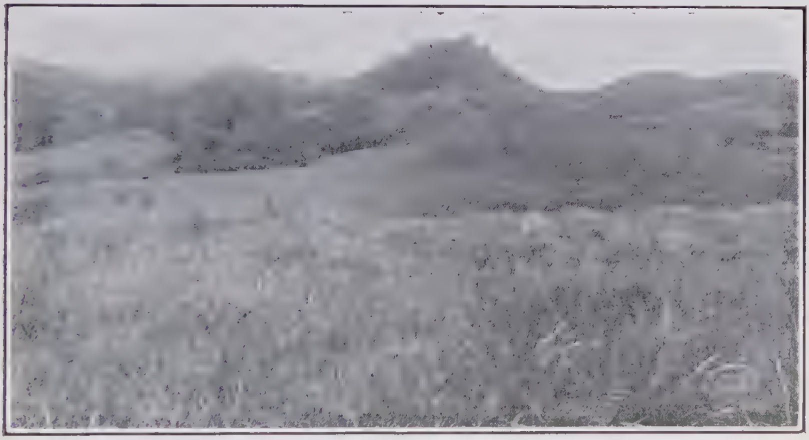

FIG. 3—Cogon grassland, from which the forest has been removed by "caingin making."

The prevention of further destruction of the virgin forest, and the reforestation of the grassy regions on non-agricultural lands, both by the prevention of fires, and by planting, are the greatest forestry problems of the Philippine Islands.

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* All the illustrations for this article are from photographs by the Philippine Forestry Bureau.

The variations in climate, soil, and exposure determine various types of forest. Ten such types are here described, the first five of which have one family of trees, the dipterocarps, predominating.

1. The *Lauan type* is the most successful commercial forest in the Island. It is confined to regions of short or no dry season, and is best developed on gentle slopes at mountain bases, up to an altitude of 1,200 feet. It is comparatively free from jungle undergrowth and has a very complex small-tree flora, with many climbing palms. This forest has a rather closed canopy and regular profile. The forest floor, because of the shade, has a very scanty growth of herbaceous vegetation. "Stripped of its ornaments of palms, leaves, epiphytic orchids, and ferns, whose importance is exaggerated in the eyes of the people of the temperate regions, the lauan type of forest has a striking resemblance to the commercial forest of the temperate zone."

2. The *Lauan-hagachak type* occurs in regions with rainfall well distributed throughout the year, and even here is restricted to areas where the water level is near the surface of the ground. It is at its best on river bottoms. There is a larger variety of trees in this type of forest than in the lauan type.

3. The *Yacal-lauan type* is best developed where the dry season is short, and on volcanic soils. Hence the areas are not large.

4. The *Lauan-apitong type* is found in regions of longer dry season than the lauan type; hence shows a decided deciduous element in the dry season. On the lighter soils it is quite open, allowing the entrance of jungle undergrowth, especially the erect bamboo. The composition of dominant species is more complex than is the case in the lauan type, and with the rather scattered trees and the bamboo undergrowth, the forest has the appearance of a park.

5. The *Tanguile-oak type* lies above the lauan forest standing from about 1,200 feet to 2,500 feet above the sea level. Here the rain is more evenly distributed through the year, and the relative humidity is higher than is the case in the previous types. This is a meeting ground for many species from above as well as from below. This forest grades into the mossy forest above.

6. The *Molave type* occurs usually on dry limestone soil. This type covers an area of about 4,000 square miles. The trees are the

most valuable in the archipelago, and since the areas are most easily reached, this type of forest has suffered most by exploitation. The forest is open, with large trees few and far apart, and with spaces filled by jungle growth. It is decidedly deciduous in the dry season. Its composition is quite variable in different regions, depending upon differences of soil and exposure. It is very valuable because of its narra, acle, and other hard and durable timbers of high value as furniture and cabinet woods.

7. The *Mangrove type* is a forest of the sea; especially well developed in mud flats at mouths of rivers. A zone of nipa palm lies usually at the upper margin of the forest area. The canopy is well closed and even, and undergrowth is absent. It is estimated that the swamps of the islands will show an average volume of 283 cubic feet per acre of trees over eight inches in diameter. This forest is a very valuable source of firewood, charcoal and cutch.

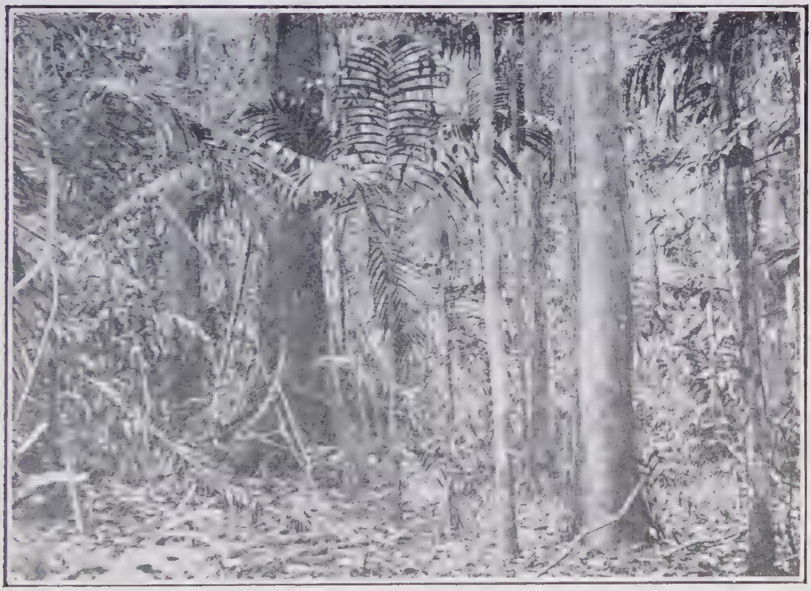

FIG. 4—Typical lauan forest in Mindoro.

8. The *Beach type* is found on sandy beaches above high-tide. It has been much interrupted by cultivation. In the Davao region it is rich in timber, running to 100,000 board feet per acre.

9. The *Pine type* is best developed in the high plateau of northern Luzon, from altitudes of 2,500 to 5,000 feet. The trees are scat-

tered as single individuals in a grass area. There is ample evidence that broad leaved trees once occupying the area have been exterminated by man. The pine, less sensitive to fires, has won its way back, and is holding its own in a region that would normally be occupied by broad leaved species. There are only two or three species of pine found in the Islands.

10. The *Mossy-forest type* occupies about 3,200 square miles or about three per cent of the land surface. It consists essentially of protective forests. The topography is rough and constantly changing. The soil is scarce and land slides are common. The climate is exceedingly moist, hence there is a great development of mosses and and liverworts. Because the slopes are much exposed to the wind, the trees are of dwarf and gnarly habit.

The northern half of the archipelago, consisting of Luzon, Mindoro and the northern part of the Vizayas, has been explored, charted, and commercial estimates put on record (Fig. 1). Much of the forest area of the southern half of the archipelago is still unexplored and relatively unknown. From the careful studies already made, it is estimated that there are now standing and ready for trade under present market conditions, 200 billion board feet of merchantable timber. Since more than 98 per cent of the forest area is owned by the Insular government, this is all national forest, and as such has over one-half as much available timber as we have in all our national forests in America. In round numbers, the Philippine forests have at the present about the same number of cubic feet of timber available as the state of Minnesota now has, or about one-half what is still standing in the state of Washington. But the Philippine area produces largely woods of much higher value than that of our northern forests.

It is estimated that there are over 2,500 tree species represented in the Philippine forests. But most of these are little known, and rare, and will play no part in the lumber industry. Dr. Whitford gives a popular description of 106 trees, all that have any prominence in the lumber markets. Briefer mention is made of 272 other trees of common occurrence. The most important species are illustrated with full page plates showing the forest, or the particular tree as it stands, giving a good idea of the habit of bole and bark, and often with leaves or fruit included. Very fine full page pen drawings of twig, leaf or fruit also accompany the description of the more important species. Only one thing seems to be lacking here, and that is a three color print of the finished wood to show the beauty of pattern and color. But this want is provided by the Bureau in another, and perhaps even better way, by the preparation and sale of hand specimens of over 400 of the principal merchantable woods.*

Most of the tree species are found in all the islands, and the variety is everywhere great. Dr. Whitford records an extreme case of eighty different tree species found on a given acre, and of these only two species which reach a merchantable size when mature. These studies have brought out the surprising fact that 70 per cent of the total forest wealth of the Islands is found in the Dipterocarp family alone, the lauans, apitongs, and yacals. Moreover, these species are usually found in almost pure stands, recalling the pine areas of our Great Lakes region. They are among the largest trees in the forests, reaching a height of 200 feet, and a diameter of seven feet or over, and the conditions invite the use of steam and the most up to date logging methods. Then, too, they are construction timbers, and take their place in the market along side of the American pine, fir and oak.

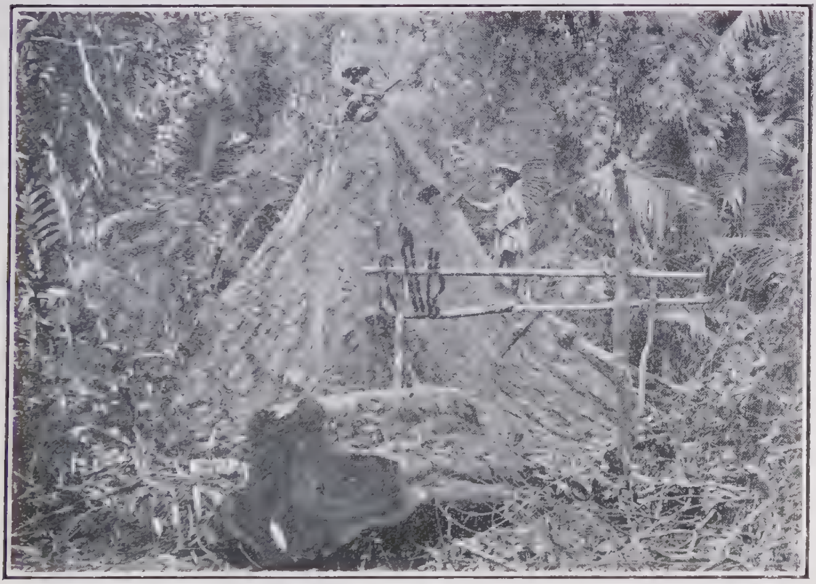

FIG. 5—Cutting out a single piece table top from a buttress of the narra tree.

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* Each sample is about four by six inches and three-eighths inch thick, with planed surfaces to show the grain. These samples are sold at ten cents each, plus four cents postage, though twenty-one of the hardest and rarest of them are held at twenty cents each.

Next in importance to the dipterocarps, is the narra or locust family, furnishing many of the most beautiful of the cabinet woods. The dipterocarps are tolerant of shade, while the narras are light loving. As a consequence the dipterocarps occupy large areas of rich soils and well watered lands with relatively pure stands, while the narras occur isolated, in places of dry or sandy soil, or along streams. Six species of the narra family, narra, tindalo, banuyo, supa, acle, and ipil, are superb in color, grain and texture, and "for furniture and cabinet making will compare with any six other woods in the markets of the world."

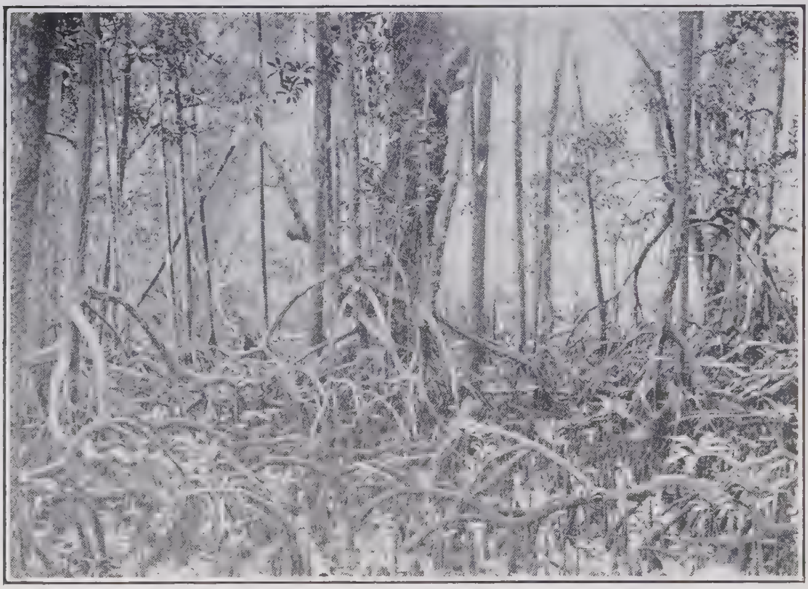

Fig. 6—Interior of a mangrove swamp, on Mindoro Island.

There are no woods anywhere more beautiful than the red and yellow narra, and the trees furnish merchantable logs up to fifty feet in length, and exceptional trees to seven feet in diameter, while the wide spreading buttresses furnish single piece table tops up to seven feet or over in diameter. The white and red lauan and the calantas work as easily as pine, yet are as beautiful in the finished work as mahogany.

The business of lumbering in the Philippines is not well developed. About 70,000,000 feet of native lumber was used in the islands last year, and 20,000,000 feet imported from America, mostly for the use of the army. Most of the licenses issued by the government are for small operators. Only three companies are using steam and American logging methods, yet there are large opportunities for development. "It is estimated that the forests properly managed can be made to yield two billion board feet annually, without being damaged. This will allow a rotation of one hundred years."

There are minor forest productions of great interest and large possibilities. There are fortunes to be made in the cutch industry, the mangrove swamps supplying the bark. These barks show from 12.5 to 39.3 per cent tannin. "It has been demonstrated beyond doubt that the soil and climate of the Philippines are favorable to the growth of the standard rubber trees." One plantation in the island of Basilan is already successfully producing rubber, and others are being started, with large promise in development. All the forests produce the rattans, though the best come from Palawan. There are large possibilities in the use of this material, for baling, matting, the furniture trade, and a great extension in plaited and woven work. The sap from the flower stalk of the nipa palms, and from the buri palm, already supply the alcohol and vinegar and fermented liquor (tuba) used in the islands, but as a source of commercial alcohol there are almost endless possibilities. The sap has as high a percentage of sugar as has the sugar beet of Prussia. Hundreds of square miles of nipa swamps lie unused and ready for continuous production.

Concessions cost nothing, and exclusive privileges may be obtained in tracts up to several hundred square miles in area. Stumpage is sold for less than half what is charged for similar forests in neighboring lands. Forest charges for the materials derived are low, averaging ten per cent of the local market price at place of production. Only the timber and minor forest products are sold, the land remains in the possession of the government.

We, as Americans may congratulate ourselves on the fact that we have achieved a good government in the Philippines, that the tremendous possibilities of wealth production in the islands are being so successfully studied, that the resources are being made available in such a way as to conserve the resources, and at the same time the rights of the Islanders. The forests as they are now may easily produce over three hundred million dollars of wealth each year indefinitely; and if, by reforestation and fire control, and other wise forestry plans which Major Ahern has adopted can be carried out, in two generations this enormous forest asset may be doubled.

COMPLETION OF THE RAILROAD ACROSS THE FLORIDA KEYS

BY

ROLAND M. HARPER

The arrival of the first through passenger train on the Florida East Coast R.R., at Key West on Jan. 22, 1912, which was celebrated by appropriate and elaborate ceremonies, marks the completion of one of the greatest engineering feats of the century, one unparalleled in the whole history of railroad building. A great deal has been published in newspapers and magazines in recent years about this unique "sea-going railroad," but a brief sketch of its history may interest those who are not already familiar with the facts.

The Florida Keys, as is well known, are a chain of low rocky islands fringing the southern coast of Florida, extending in a gentle curve along the Gulf Stream from Key Biscayne, southeast of Miami, to Key West, a distance of about 140 miles. The distance between neighboring keys varies from a few hundred feet to several miles, and the maximum depth of the channels between them is about twenty-five feet. Key West, the only settlement of any consequence on the Keys, is located on an island of the same name about a mile wide and four miles long, and had 19,945 inhabitants by the census of 1910. It is the southernmost city in the United States (lat. 24° 33′), and for years was by far the largest one without railroad facilities. It is estimated that about half the inhabitants of the city had never seen a train before.

The construction of the East Coast R.R. southwestward from Miami, which had been its southern terminus (and the southernmost railroad station in the United States) since 1896, was begun in 1903. For the first twenty-eight miles, to Homestead, the route was through level rocky pine woods, and presented no special difficulties. From this point surveys were first made to Cape Sable, at the southwestern corner of the peninsula, perhaps not so much with a view of making that the terminus as of getting certain concessions from the people of Key West. The route over the Keys having been decided on, construction of the track beyond Homestead was begun in 1905. A mile from Homestead the railroad takes a S.S.E. course and enters the coast prairie, a flat marly region similar in general appearance to the southern part of the Everglades, but occasionally inundated by salt water in times of storms or strong southeast winds, and dotted with millions of mangrove bushes three or four feet tall. In the coast prairie the railroad was built with the aid of two dredges, each of which excavated a ditch in the soft marl and deposited the material between them to make an embankment. After traversing the coast prairie, and the marshes south of it, in an air-line for fifteen or twenty miles, the railroad crosses a salt-water channel known as Jewfish Creek, and enters upon Key Largo, the largest of the Keys, about 100 miles from Key West. Knight's Key, forty-five miles from Key West, was reached early in 1908, and as one of the most difficult channels to cross lay just beyond, this was made a temporary terminus. Piers were built, and steamers made daily trips from there to Key West and Havana in winter (tri-weekly at other seasons).

The work of extending the railroad to Key West was pushed as actively as possible, sometimes as many as 3,000 men being employed at one time; but so many difficulties and set-backs were encountered that four years were consumed in completing the remaining forty-five miles.

The difficulties of constructing the railroad over the Keys were of several kinds. In the first place, there were about seventeen miles of channels to be bridged, most of them by a series of reinforced concrete arches, standing thirty feet above mean sea-level, so as to be out of reach of the highest storm waves. Three draw-bridges were also required. The construction of the concrete viaducts required several hundred thousand barrels of cement and several thousand tons of steel rods, all of which had to be hauled hundreds of miles, for almost the only Florida product used in the work was pine timber for cross-ties, piles, and temporary trestles. Even the laborers (all or nearly all of them white men) were largely recruited from the slums of northern cities.

There being practically no fresh water on the Keys, all the water used in boilers and for drinking, cooking, etc., was taken from the ditches alongside of the track in the coast prairie previously mentioned, and hauled down to the construction camps by train. There is a pumping station at Everglade, fifteen miles south of Homestead, and to this the water-train made a trip every night while the work was going on between Knight's Key and Key West. Mosquitoes are said to be exceedingly troublesome on the Keys at times, and must have hindered the work to an appreciable extent.

One of the greatest drawbacks to building a railroad in such an exposed situation was the West Indian hurricanes which visit the Florida coast nearly every fall. The first one that struck the Keys while the railroad was being built there caused considerable loss of life among the workmen, but after that more precautions were taken. The engineers who had their families with them used to send the women and children back to the mainland every September, to remain until the storm period was over. The smaller channels between the keys were crossed at first by means of rock embankments, but it was soon found that the autumnal storms washed these away almost as if they were sand, and that marl dredged up from the bottom of the bay resisted the fury of the waves much better. Many of the rock embankments north of Knight's Key had to be replaced in 1910, some with marl and some with concrete arches. Although it endures storms very well, the marl is gradually undermined by the constant lapping of small waves, and one problem that still confronts the engineers is to find plants which will grow in that raw and wave-washed soil thickly enough to protect the embankments at all times.

A minor difficulty is the corrosive action of the warm salt water and spray on rails, steel girders and concrete piers. Just beyond Knight's Key is a seven-mile steel girder viaduct on which a large force of painters will have to be kept at work all the time. The water also dissolves cement slowly, and just what will have to be done to preserve the concrete piers remains to be seen.

The building of the railroad over 100 miles of keys is said to have cost about $15,000,000, or $150,000 a mile. But for the fact that this railroad (522 miles of main line between Jacksonville and Key West and about 200 miles of branches) is the property of one man, Mr. Henry M. Flagler, who was anxious to see his pet project completed during his lifetime (he is now 82 years old), and was able to pay for it out of his own pocket, Key West might have remained without railroad connections for several years longer, for the economic advantages to be derived from the building of the "sea-going railroad" are obviously not very numerous.

The establishment of a port at Knight's Key shortened the time of transit from the mainland to Cuba and points south of there by several hours, for before that, one had to embark on a steamer at least as far north as Miami. Key West has no advantage over Knight's Key in that respect, for the shorter distance between Key West and Havana will be counterbalanced by the extra length of the railroad journey; but it will have a slight advantage in trading with northern Mexican ports. This railroad will doubtless get its share of the increased business that is expected to come to all southern transportation lines on the completion of the Panama Canal, and the foreign commerce can of course be handled much better in a city like Key West than at a temporary terminus like Knight's Key.

But the amount of commerce that will go through Key West is problematical, for the Florida East Coast R.R. has strong competition from steamship lines for its whole length, and its freight traffic will probably have to depend largely on perishable fruits and vegetables from the tropics. The principal products of Key West itself are cigars and sponges, and those are not particularly perishable. The remaining Keys are very sparsely settled.

One incidental result of building a railroad on the Keys, which must be regretted, is that it has greatly increased the frequency of forest fires there. The higher parts of the Keys are covered with dense forests made up of a great variety of tropical trees, among them such valuable species as mahogany and lignum-vitæ, which are not found elsewhere in the United States. These forests take fire very readily in the dry season, and the destruction in such cases is almost complete over large areas. A large part of Key Largo was burned over in the spring of 1910, costing the railroad a considerable sum in damages, it is said.

Key West, which hitherto, as far as foreign commerce is concerned, has been little more than a coaling station and naval base, having suddenly risen to the rank of a first-class seaport, will doubtless now increase in population and economic importance as rapidly as the small size of the island and the limited water supply will allow.

Geographers, too, should be thankful to Mr. Flagler for greatly improving the facilities for exploring this unique corner of our country; and the genius of his constructing engineers, first, Mr. J. C. Meredith, who worked out the plans for the "sea-going railroad" but did not live to see it completed; and then Mr. W. J. Krome, who had charge of the work during the last and most difficult stages, should not be forgotten.

FORMS OF TERRESTRIAL RELIEF
A REVIEW*

BY

R. S. TARR

The first number of this atlas is now being distributed in the form of a Fascicule-Specimen, and there is thus basis for judgment of the merit of the plan, about which geographers have already been informed by circular. Surely the Specimen gives every reason to predict a complete success for the project.

The plan, bearing the stamp of approval of the International Geographical Congress, is to issue a series of plates, illustrating eventually all important features of the forms of the land. It is estimated that about 480 such plates will be required in all, and the present plan is to issue forty-eight plates in a year. Thus the period of execution of the complete atlas will require from eight to ten years. A definite classification of forms to be included has been made out with nine major headings, and a large number of subheadings; but it is not proposed to follow this plan in the order of appearance of the plates. For example, in the specimen before us there are illustrations of seven of the nine major topics. But when the atlas is completed all these nine major topics, and each of the subdivisions, will be appropriately illustrated.

It was in 1907 that the project was first broached by Professor Emile Chaix, of Geneva, and in 1909 it was brought before the Ninth International Geographical Congress which met in Geneva. An international committee numbering twenty-eight has been named, on which the American members are Professors W. W. Atwood, W. M. Davis, and R. S. Tarr; and which includes a large number of the leading geographers of Europe. There is an executive committee consisting of Professors J. Brunhes, E. Chaix and Emm. de Martonne, upon whom, of course, the great mass of the work falls, and to whom chief credit must be given for the plan and for so much of the execution of the plan as has so far appeared. For what they have already done, and for what they plan to do, these three men deserve very great credit. Without hope of reward, at their own expense, they have given of their time and money to further a project that will be of value to science and to fellow workers.

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* Atlas Photographique des Formes du Relief Terrestre. Documents Morphologiques Caractéristiques, avec Notices Scientifiques. Publiés conformément à un vœu du IX^{e} Congrès International de Géographie sous les auspices d'une Commission internationale permanente, par J. Brunhes, E. Chaix, Emm. de Martonne, Éditeurs. Fréd. Boissonnas et Cie., Genève. Fascicule-Specimen.

What their general plan is may be inferred from the specimen now distributed. In it there are eight plates, each illustrating a particular form or combination of forms of the land. The locality and date of each picture is given, the name of the photographer, and a title; and accompanying the plate is a brief description or interpretation of the phenomena, a map showing the position of the photograph, and one or more diagrams. These descriptions are in French, German or English, according to the writer's nationality; but in the two latter cases there is added a French abstract of the description. The entire series of plates and printed pages are loose in a thick paper cover and can later be bound either in the order they appear or on the basis of the topical plan, or they may be used individually.

The work of the committee in selecting the photographs for this fascicule has been carried out with excellent judgment. Where all the photographs are of such good quality and the subject matter so interesting, it is not possible fairly to select some for special praise; but surely physiographers will be impressed by the remarkable desert pictures in Plate 7; and the striking cirques and cirque erosion illustrated in Plate 6. The other pictures are all of their kind remarkable for the clearness with which they illustrate the points intended.

No little part of the credit for the success of this Specimen is due to the publishers, Fréd. Boissonnas et Cie, Geneva, widely known for their high-class work. The photographic reproductions (Phototypie S.A.D.A.G.), which are greatly superior to our ordinary halftones, will strike geographers as remarkable for clearness of detail and generally artistic quality. The plates and the text are of such quality as to appeal to individual geographers, libraries, and geographical societies; and they will be found exceedingly valuable in college laboratories and schools where geography is taught.

That the atlas will prove a success there seems little reason to doubt; but for its success the project needs the support of geographers in two very important directions. The first of these is cooperation in the supply of photographs suitable for incorporation in the work. An appeal is made for the loan (or preferably gift) of good, clear photographs illustrating specific features of the forms of the land. There are thousands of such photographs in the hands of hundreds of individuals, now serving little if any purpose, which in this atlas may be made available for the use of geographers of this and succeeding generations. It is urgently requested that anyone having good photographs of any phase of earth form, which they would be willing to have used for this purpose, submit them to the Executive Committee; and if used full credit will of course be given for their use. Only in this way will it be possible to secure the best illustrations.

The second way in which aid is needed is in the form of subscriptions to the atlas. On the basis of the preliminary circular, only about 100 subscribers were secured and only five of them were from the United States. Although it is purely a work of devotion to science, with no thought or chance of personal profit, this project cannot be carried to completeness without financial support. In order to give it the widest possible chance of usefulness the price has been put at the very low sum of 30 francs for 48 plates, the proposed issue for the year,—that is at the rate of 63 centimes (a little over 12 cents) per plate with accompanying text. At this price not less than 200 subscriptions are absolutely necessary in order to meet the expenses of publication. It is sincerely to be hoped, and now that the Fascicule-Specimen can be seen, it is confidently believed by the writer, that the atlas will be generously supported, and that the United States will contribute its share of subscriptions to this noteworthy publication. The subscription blank offers the alternative of subscribing either for the first year or for the entire series.

Any correspondence relating to the furnishing of photographs for the atlas should be addressed to Prof. E. Chaix, Avenue du Mail 23, Genève, Switzerland; and subscriptions may be made through the publishers, Fréd. Boissonnas & Cie, Genève, Switzerland.

The general scope of the atlas is shown by the titles of the plates which appear in the Fascicule-Specimen:

Plate I: Le Grand-Combin, seen from Mont de a Gouille (Valais Alps). Forms due to mechanical disaggregation. Plate II: Ravin de Théus near Gap (Hautes-Alpes). Elementary forms of erosion by running water. Plate III: Cevennes. Cevenol plateau, on the watershed between the Allier and Borne. 1, Senile forms of fluvial erosion (peneplain), with commencement of rejuvenation; 2, Cevennes near Valgorge. Mediterranean slope of the central French massif. Rejuvenation of senile forms by fluvial erosion. Peneplain

carved in crests. Plate IV: 1, Sungaria. Lower valley of the Darbuti river. Fault valley. 2. The dead plain of Wildstrubal (Oberland). Example of fault worn by subsequent erosive action. Plate V: James Peak, Front Rocky Mountains. Senile forms rejuvenated by glacier action. Plate VI: The Stockhorn, Bernese Alps. An example of ancient glacial erosion. Plate VII: The Erg, seen from Taghit—contact of *erg* and *hammâda* (Algerian Sahara). Complex desert forms. Plate VIII: Cliffs of Pays de Caux and St. Jean de Luz. Elementary forms of littoral erosion.

THE INFLUENCE OF THE PRESENCE, DISCOVERY AND DISTRIBUTION OF THE PRECIOUS METALS IN AMERICA ON THE MIGRATION OF PEOPLE[*]

BY

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In a previous section[†] was traced the exploration carried on by the three leading nations in America,—Spanish, English and French. The exploring parties in some cases became so large and numerous that they really constituted a migration, a flood of immigration. It is difficult to establish a line that will properly delimit explorers and adventurers from immigrants, but for all practical purposes those who come and roam about with no intention of remaining in a place may be classed in the first group; those who come ostensibly to remain, even though not permanently in one place, may be put in the second group. A migration has the idea of mass movement and for a more or less permanent home, while the exploring party is small and never intends to abide.

SPANISH MIGRATIONS. Myers[‡] speaks of the migration of adventurers and colonists from Spain to America in the Sixteenth

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[*] This paper is a portion of the thesis presented as a part of the requirement for the Ph.D. degree in Geography at Cornell University. For other parts see this Bulletin, Vol. XLII, pp. 594–602; Scott. Geog. Mag., Vol. XXVI, pp. 449–466; Vol. XXVII, pp. 417 and 470; Bull. Phil. Geog. Soc., Vol. IX, pp. 1–22; Vol. X, pp. 36–50. Special thanks are herein expressed for criticism and suggestion given by Professors R. S. Tarr, H. Ries, and W. F. Willcox, throughout the whole work.

[†] *Bulletin*, Vol. XLII, pp. 594–602.

[‡] Myers, P. V. W. Gen. Hist., 1889, pp. 517, 518.

Century as to be compared only with that to California and the West in 1849 and subsequently. It was more scattered in destination, and less scattered in source. Moved by the stories of rich deposits, the desire for adventure and for a new home, thousands of Spanish and Portuguese took passage for the new continent. Because the treasure could be found in so many places, and because gold and silver had the greatest attraction, they occupied nearly all parts of South America and Mexico, and even established themselves in territory constituting at present southwestern United States. The mines in America, in these early days, drew no small part of their workers from the mines in Spain, although many of the laborers were Indians and Negroes; and, inasmuch as the precious metals were found well distributed over South America and Mexico, the colonists, scattered over all this region, have given an Iberian color to the life and activities of the whole territory.

English Immigration. South American mines were worked nearly a century, before English immigration made a beginning on the North Atlantic coast and spread westward across the lowlands to the foot-hills from New England to Georgia; and, when the English immigration began, gold and gold hunting seem to have had little power over it. Other ends than wealth were sought. The men in that stream of colonists were almost uniformly in search of permanent homes surrounded by agriculture, lumbering, fishing, and the beginnings of manufacturing. How fortunate for these colonists that they found no gold and silver in the Appalachians, for probably, had they found deposits, their settlements would have been preceded by Spanish miners' camps, and their standards of life by those somewhat opposed to the arts of peace and husbandry.

Just as gold played no part in the immigration of the early English colonists to America, so the desire for gold was not the influence that led those waves of families and civilization across the eastern barriers and to the plains and prairies of the Mississippi Valley. Likewise, the expansion into the first row of States west of that great river, a growth partly antecedent to the discovery of gold in California, apparently cannot be traced to the influence of the precious metals. Nor can those several western movements which stretched to the Pacific coast prior to 1849, really be said to have had anything to do with gold. The Mormons were forced from behind to cross the great plains. The Oregon immigrants of 1843 were induced to go by the prospect of lucrative trade in furs. A scattered emigration from the eastern and central States sifted a sparse population of hardy pioneers through the mountains or around Cape Horn into California, Washington, and Oregon. But the motive was *not* in the gold. The results of all this fragmentary and heterogeneous westward movement of the people played its part in 1849-1853, for, when the news of the brilliant discoveries along the American River went abroad, the response first began among those who had found their way into the vicinity for other purposes than gold digging.

LOCAL EFFECTS IN 1848. Californians were at first incredulous of the discovery, and for three months the news did not reach points outside the valley. Accordingly, the response did not begin until April, 1848. Then there began a cautious ingathering, which was quickly followed by an apprehension of the magnitude of the discoveries, a quicker dissemination of the news in ever widening circles and a hasty response to the influence of the finds. The widening circle of information could travel no faster than man could move from one place to another; hence, where geographic conditions made travel easy the circle enlarged rapidly, but on the Sierra side its expansion was greatly restricted. Consequently, the first rush of eager miners came from the California Valley and the limiting slopes of the mountains into the gulches of as many of the Sierra streams as were known to possess gold-bearing gravels. California-Americans to the number of 2,000 and California-Spanish-Mexicans and Indians, in the aggregate about 3,000, were at work by the middle of the summer. The population of the mining camps was varied, to be sure, during the first summer, but no more so than was that of California and the immediate vicinity at the discovery of gold, barring a few foreign sailors who deserted their ships in harbor. The cosmopolitan nature of the migration was a feature of subsequent years and not of the first. As soon as the news had time to get to Oregon, Northern Mexico, and the Sandwich Islands, after gaining credence near home, there started parties from these places, the Argonauts, Sonorans, and Kanakas;* and as the news of the discovery reached the far-off Peruvian and Chilian, so the response came quickly in considerable parties from each country.

So great was the excitement in the California Valley, and so contagious the gold fever, that few escaped the effects of the epidemic. The main valley in close proximity to the centers of influence was pretty well drained to the gulches before the close of the season of 1848. By June, three-fourths of the male population of San Francisco had gone. *The Star,* of San Francisco, May 27, 1849, contained the following vivid description:

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*Bancroft, H. H. Hist of Calif., 1884, 7 vols., Vol. VI, p. 71.

> "Stores are closed, places of business vacated, houses are tenantless, various kinds of mechanical labor suspended or given up entirely,—everything wears a desolate and somber look, everywhere all is dull, monotonous, dead."

Newspapers ceased publication by June; town council and the sanctuary services ended; sailors, and even officers, and sometimes captains, left ship in the harbor. Mexicans and Americans were equally affected; townsmen and farmers equally impetuous; judges, priests, doctors, alcaldes, criminals and their keepers, soldiers and their officers,—all classes went. Towns and farms were equally depopulated all along the valley and coast to San Diego.*

GOLD AND SILVER PRODUCING REGIONS ARE MOUNTAINOUS. But beyond the valley on the east for a thousand miles lay mountains and deserts; and on the west, the sea. Few miners could come from adjoining territory. It was uninhabited. The gulches, themselves, and their placers were in the mountains, and the quartz veins from which these placers and essentially all others of the West were derived, lay farther up in rugged, wild, mountain masses. This topographic distribution is a result of the origin and nature of gold deposits. The metal occurs in veins and fissures, hence in regions of metamorphism, folding, and faulting; in regions where rocks may contain heated waters, often associated with intrusions or with lava flows, sometimes not yet cold.† Silver occurs in similar regions and for the same reasons. Inasmuch as rocks which have been subjected to these dynamic processes are metamorphosed and often thereby hardened, and as, with the crustal disturbances, uplift has also occurred, the country, favored with the precious metals, is usually rough, high, mountainous, and difficult of access. Reference to lists of producing States, and a comparison of these lists with a physical map of the United States, will make it clear that almost all the gold and silver produced in the country comes from two widely separated mountainous areas.

When the gold of the Southern Appalachian States was found, mining began in the midst of a well settled region, in which food-producing industries were well established, and men, although busy with other work, were right on the ground. Further, the deposits were not extensive; hence, far reaching migrations did not occur. But when the California gold was found, and, later, when both metals were discovered in other Western States, the newness, roughness, inaccessibility, and distance to centers of population had successfully restrained any considerable accumulation of people and any development of other industries. Consequently, the rich and extensive deposits, by virtue of their geographic position and associations, did not find at hand labor and supplies for their exploitation; and, when the news of their discovery went forth, it called out a great migration: a migration from distant regions where labor was more abundant.

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* Bancroft, *ibid.*, pp. 59, 263. Shinn, C. H., Mining Camps, pp. 109-114.

† Am. Inst. Min. Eng. (1903), Vol. XXXIII, pp. 790f.

EXCITEMENT IN EASTERN UNITED STATES. Word of the unusual stir on the Pacific did not reach the Atlantic coast until late in 1848, because of the great distance and difficult transportation; and, during the winter and early spring of 1849, the news was spread far afield, until by the close of summer of that year knowledge of the mining possibilities there had become world-wide. No such widespread excitement had ever been known before; and nothing so far-reaching and influential has occurred since, although just as great discoveries of wealth have been made. The sweeping force of the craze arose from the remoteness of its source, and the consequent novelty and wildness, and from the richness of the deposits compared with anything known before. It was beyond the dreams of the ancients.

As the fact took hold of the people in eastern United States, thousands determined to go. Whitney conjectures that within a few months, some 50,000 of the healthiest and most energetic young men of the nation were on their way to California. So strong was the desire to go, that many started by one of the sea routes before the winter was over; and as the weather permitted, others departed by the land routes, until almost every town throughout the Eastern States had contributed a representative to the great army now closing in on California. Whitney estimates that 100,000 reached the region during the year 1849, among whom were citizens of every State in the Union. The estimate was probably a little generous.* Land routes were popular and supplied as many miners as the sea routes, but not so continuous a stream; because most were prohibitively closed during the winter, while one might sail anytime during the twelve months.

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*Whitney, J. D., Encyclopedia Britannica, 9th Ed., Vol. 4, p. 701. Shinn, C. H., Mining Camps, p. 109. R. H. Patterson (The New Golden Age, Vol. 1, pp. 108–9) estimates the white population of California, in 1850, at less than 100,000, and quotes the census of Nov., 1852, at 170,000 whites. Shinn (Mining Camps, p. 132) says: "In December, 1849, there were 53,000 Americans in California," and a few pages later, states that in 1849 35,000 persons came to California by sea, and 42,000 by land. Not many had left for other fields as early as the close of 1849. Perhaps as much credence should be given to Whitney as to Shinn, who presents considerable discrepancy in his own statements.

Land Routes. Overland routes had been known for years prior to 1848.* The fur traders had worked them out, and the explorers had mapped some of them; but it should be remembered, that they were not made for continuous traffic across the continent. The connecting passes and high level routes had not become well established because so little used. Even the well ordered trails, formerly used primarily for freight, now became great passenger routes.

A common starting point was at the elbow of the Missouri River, but several towns in the vicinity became outfitting towns: St. Joseph, Westport, Leavenworth, Ft. Kearney, Independence, Kansas City, and even Omaha became important commercial centers in the effort to meet the needs of the trade. The northern routes to Laramie and South Pass conducted rather more emigrants westward that the southern route to Sante Fé, probably because the gold was mainly in the northern half of California, and because the emigrants did not know, or at least realize, that a longer journey, but at a much less altitude, bv Sante Fé might bring them to their desired grounds equally as soon. Possibly the aridity and lack of settlements tended to keep people from the southern route, while the recruiting station at Salt Lake City offered a chance to rest by the northern line. The routes followed by the land emigrants through Salt Lake City led through rugged mountain passes and over long desert stretches; and then, as the pioneers approached the eastern flank of the Sierras in the rush to be first into the coveted gravels, they began to scatter and thus were compelled to use poorer, less traveled trails both up the slopes and through the passes of the crest. Having passed the summit, they scattered down the gulches from the Pitt in the north to the Tuolumne in the south. This brought them first to the upper ends of the steep, deep, defiles whose floors farther down were auriferous gravels.

These northern routes were beset by Indians. As long as the migration consisted of the fur-traders and an occasional settler, the natives cared little; but when the glamor and attractiveness of gold brought thousands of prairie schooners sailing across their grounds in one summer, and when towns and roads and all that drives out wilderness crowded in and claimed their habitat, they became restless, then revengeful. It only needed the lack of watchfulness on the part of the government, whose attention was elsewhere at the time, to permit the outbreak of trouble and hostilities beween the Indians and the settlers in 1862.

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Parkman, Francis. The Oregon Trail.
Semple, E. C. Amer. Hist. and Its Geographic Conditions, 1903.

Those who came by the southern route past Sante Fé, along the Gila River or the Spanish Trail, and across the Colorado River at Yuma into Southern California had to endure more desert, found a warmer climate, less rainfall, less forest, and had no great altitudes to traverse. They came into the California Valley and swung northwestward through the tule-covered swampland, or along the western foot of the mountains, and entered the gulches at their lower or western ends. They were led through territory already appropriated by Mexicans; and after the first summer, had not only the wicked Apache Indians to watch, but also the outlaw or the expelled Mexican miner who frequented these roads and robbed the traveler. Returning miners who presumably had in possession at least samples of California's treasures, proved most fascinating bait. Robbing became quite a business under the superior temptation presented by the returning miners, or by those going to new fields with their accumulated wealth in their belts. And not only was robbery committed, but occasionally entire parties were put out of the way by outlaws lurking in the defiles through which the caravan must proceed. In California, express companies abandoned their routes, because their goods so endangered the lives of their drivers. Robbing and murder were not local features but occurred on most of the trails and even on the highways between the mines and their trading centers.

The water routes worked out under the lead of gold were varied; but those broken at the Isthmus gave at least a possibility of a shorter time period than either the overland or Cape Horn route, hence they were always overcrowded. Until 1855, when the Panama railroad began duty, more emigrants, bound for California, arrived at the Atlantic ports than Isthmian transportation could be found for; and many more succeeded in crossing and reached the western ports than could find passage on the Pacific vessels to California, partly because so many Pacific ships were tied up at San Francisco. Consequently hundreds, probably thousands, were delayed between the two oceans, and became the prey of malarious diseases, which they were often unable to shake off, and therefore were never able to grasp the gold they were seeking. A goodly number sailed around Cape Horn; and in these long journeys, subsisting on improper food, ran the risk of scurvy to which many fell victims. By December, 1848, the stream of emigration had become a rush. Ships were loaded at almost every Atlantic port. Vessels were drawn from the whaling business and from all kinds of trade greatly to the disarrangement of other commercial lines.*

Gold Created Great Migration. When one compares the small trickling stream of migration to the Far West prior to 1848 with the mighty river which surged through the passes and deluged the deserts between 1849 and 1856, he arrives at an expression for the magnitude of the influence emanating from the California gravels. Nor should the numerical response alone be taken as the measure of the influence. The obstacles to overcome, because the gold occurred in a far away mountain wilderness, were gigantic; over 3,000 miles by land for the far easterner; 2,000 miles for the prairie farmer; deserts, sand and dust, mountains and forest, snows and exposure, three or four months of severe hardship and privation; or, if by water, exposed for as long a time to dangers by sea; the sacrifice of home and its associations and comforts; the denial of friends, business and pleasures; and finally the expense of all this journey with only a hope at the end. Truly, tremendous, must have been that power over the lives of men to induce such enthusiasm and excitement, and to make men willing to submit themselves and often their families to such hardships. Chittenden† justly styles the movement as one of the most wonderful migrations of people on record.

Those going by sea were almost entirely from the coast regions, while those of the interior waited for spring to open up the land route. The response was strongest throughout the great Missisippi Valley, perhaps, because many of these people had moved once within the generation and were thus more susceptible to the moving fever than those farther east; perhaps, because they were nearer the gold fields.

Yet not only did the people of the eastern United States catch the gold fever and respond to the call; but, in the latter part of 1848 and during 1849, some 2,000 immigrants reached California from Oregon and Washington; and by July, 1849, 15,000 foreigners from Mexico, Chili, Peru, and other Pacific States had arrived. New Holland, Australia, the Marquesas Islands, and even China each sent its quota. Just a year from the discovery of gold, a flood of European emigrants, mostly British, arrived to try their fortunes.* In fact, nearly every civilized land was represented in the diggings of California during the course of the first five years. The Southern Appalachians happily sent to the West many men who knew the processes of placer mining, and found in California a larger freedom in which local mining institutions were rapidly developing.† European mining regions sent squads of miners trained in conservative methods of mining and disciplined in knowledge of camp life and organization, who contributed both to the common fund in their adopted country. Many miners from the south brought along a few negroes, thus adding another element to the ample heterogeneity of the mass collected around the mining centers of California.

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* H. H. Bancroft (Hist. of Calif., Vol. VI, pp. 121-5) gives the following figures attesting the volume of emigration from Eastern United States by sea: From six Atlantic ports between the dates of December 14, 1848, and January 18, 1849, 61 vessels carrying an average of 50 persons set sail. In the month of February, 1849, 60 vessels weighed anchor in New York Harbor loaded with California passengers, and 70 more in the harbors of Boston and Philadelphia. During the winter of 1849-50, 250 vessels sailed from Atlantic ports for California, 45 of which arrived in San Francisco Bay on the same day.

† Chittenden, H. M. Early Steamboat Navigation on The Missouri River, 1903, Vol, I, pp. 173, 4.

Japan's stolidity under the almost universal excitement is somewhat remarkable; but it is asserted by Bancroft‡ that she was almost absolutely indifferent to all the world's bustle and flurry; and the almost total absence of the Japanese from California until many years after bears silent testimony to his indifference. With China, the case was very different. Either in direct response to the influence of gold in the rocks, or else with a desire to engage in some other business than mining, but tributary to it, her people came; 3 in 1848, 700 in 1849, over 3,000 in 1850, as many more in 1851, and about 10,000 in 1852, so that by the opening of 1853 at least 20,000 Chinese were in the State. Then the incoming rapidly declined.§ A great many arrived from the Hawaiian Islands and easily became the menial class. They were accustomed to it, and were willing, when there arose a need for such work, to be laborers of the lowest class. Moreover, the fact that gold had been acquired with simple, cheap equipment, and that no one had been able to hire laborers in the placers for what such laborers easily ran the chance of making when working for themselves, had given rise to a universal aristocracy with no true laboring class. When, owing to changed mining conditions, such a class became necessary, the ports of China were nearer in time, expense, and hardship than were the Eastern States, hence the Chinaman stepped in and became the common drudge.*

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* Patterson, R. H. The New Golden Age, 1882, Vol. I, pp. 104, 5.

† Shinn, C. H. Mining Camps, 1885, p. 40.

‡ Bancroft, H. H. Hist. of Calif., Vol. VI, p. 124.

§ *Ibid.*, Vol. VII, p.335 f; Semple, E. C., American History and its Geographical Conditions, 1903, p. 319.

Prior to the discovery of gold in California, the Spanish-Mexicans were coming into the valley in greater numbers than the Americans. The query might well arise, would this condition have continued, had not the new mining industry invited the thousands to immigrate? And had it continued, would not the Americans, when the time came for their expansion, have found little desirable land unoccupied? The discoveries seem from this point of view to have been very timely.

INCREASE OF POPULATION. No statement of the increase of population in California will portray the phenomenal growth better than can be done with a few figures. Each year before 1848, a few had come until, by the summer of 1845, just prior to any emigration which could possibly be ascribed to the influence of gold, the State contained 2,000 Americans and as many Mexicans. In December of the same year there were 6,000; in July 1849, 15,000 and in December, 53,000. In June 1850, the total white population was 92,597 and in November, 1852, according to the census taken that month, it amounted to 269,000, of which about 30,000 were Indians, 20,000 Chinese and 2,000 negroes.† The center of population in the United States migrated 81 miles westward during the decade 1850-1860, the movement being about 50 per cent. larger than that of preceding decades, and a result of the emigrating impulse that was filling up the far western territory.

This same phenomenal growth of population has been witnessed in most of the newly discovered gold regions. In Alaska, the Nome coast furnishes an illustration where the conditions were even harder to meet than those of California. On January 1, 1899, a few Eskimo huts and one or two sod houses for white men were the only human habitations along 60 miles of coast. In June, a dozen or score of tents housed the entire population, and in October, 5,000 whites were dwelling on the beach.‡ Another illustration comes from Australia. Gold was discovered in Victoria in 1851. Previous immigration had been rapid, but at this time it took a sudden leap. In 1846, Victoria contained 33,000 people; in 1851, 51,000; and in 1854, 236,000.*

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* Semple, E. C., *loc. cit.*, p. 320.

† Patterson, R. H. The New Golden Age, &c., Vol. I, pp. 108-9. Shinn, C. H. Mining Camps, p. 132. Abstract 12th Census of the United States, pp. 32-33.

‡ U. S. G. S. Prelim. Rept. on Cape Nome Region, Alaska, Brooks & Schrader, p. 45.

OTHER EFFECTS ON POPULATION. This rapid growth in the number of people was not the only effect of the precious metals on the population of the West. Society was masculine, and most of the men were under forty years of age. Only men of youth and vigor could make the journey or bear the privations and exposure of camp life. Wisely, the selection in the main occurred in the homes, and only the young, healthy men started. The novelty and wildness, the adventure and risk of the journey and of mining, appealed to the young men more than to those who were rooted in business or family. Shinn† says there were but 15 women in San Francisco in the Spring of 1849. There were many camps with none at all, and others containing but one family among, say 40 single men. Perhaps the inequality of the sexes numerically was greater among the Chinese than among any other nationality. In August, 1852, not one in a thousand among them was a woman.‡ Bancroft, after discussing the manliness and strength of character of the men who came under the influence of gold mining camp life, remarks that "the comparative superiority of the men over women is an expression of the law that the power of attraction due to gold and silver does not tear away from civilized and cultured comforts the same select grades of both. Nor do the mining habits develop the same admirable qualities in women as in men.§ Even in the report of the 12th Census 1900, there is shown a remarkable difference in the number of men and of women in the mining States of the West, a condition not entirely due to the mining industry, but partly to the fact that these States constituted a part of our frontier. Table I summarizes the population conditions in the mining States and Territories and in some others. In Arizona, Idaho, Montana, Nevada, Wyoming and Alaska mining constituted a larger per cent. of the total industries of the region than in the others, and here the largest percentages of male population were found. In Utah, although mining constituted a considerable portion of the business, religious influences kept the percentage of males lower than in any other State west of the Mississippi, except Louisiana. Nevada presents an interesting example. In 1880, her population was 62,266; and it has been declining ever since, while the percentage of females has been increasing. The declining industry through these twenty years is that of mining. It seems probable that the miners who are going to other places are single men, while the family men in other occupations are remaining. If this be true, it emphasizes again the law that the precious metals attract for workmen, single men. Should it be charged that these western mining States possess a high percentage of male population, simply because they are on the frontier, the answer comes from all the States not engaged in this kind of mining whose settlement has taken place mainly since California began to be filled up, and which may, for this reason, be considered pioneer States. Table I, part B, summarizes the conditions in five of this class. The disparity of the sexes is less than half as great in these five as in the eleven western states and territories excluding Alaska. Inasmuch as Oklahoma is by far the most newly settled of all, one would expect to find it approaching California; but while it has the greatest inequality of any of the five, it is as far from California as from Kansas, the state of the second group having the minimum inequality.

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* Nicholson, J. S. Effects of Great Discoveries of Precious Metals, 1887, pp. 38-9. †*Ibid.*, p. 137.
‡ Bancroft, H. H. Hist. of Calif., Vol. VII, pp. 335f. §*Ibid.*, p. 715.

TABLE I. POPULATION OF GOLD AND SILVER MINING STATES CLASSIFIED BY SEX.

STATE OR TERRITORY.	POPULATION 1900.			PERCENTAGE.	
	MALE.	FEMALE.	TOTAL.	MALE.	FEMALE.
Part A					
Western Division....	2,297,732	1,793,617	4,091,349	56.2	43.8
Arizona..............	71,795	51,136	122,931	58.4	41.6
California...	820,531	664,522	1,485,053	55.3	44.7
Colorado	295,332	244,368	539,700	54.7	45.3
Idaho................	93,367	68,405	161,772	57.7	42.3
Montana	149,842	93,487	243,329	61.6	38.4
Nevada	25,603	16,732	42,335	60.5	39.5
New Mexico.........	104,228	91,082	195,310	53.4	46.6
North Dakota........	177,493	141,653	319,146	55.6	44.4
Oregon	232,985	180,551	413,536	56.3	43.7
South Dakota........	216,164	185,406	401,570	53.8	46.2
Utah................	141,687	135,062	276,794	51.2	48.8
Washington	304,178	213,925	518,103	58.7	41.3
Wyoming	58,184	34,347	92,531	62.9	37.1
Alaska..............	45,872	17,720	63,592	72.1	27.9
Part B					
Indian Territory......	208,952	183,108	392,060	53.3	46.7
Kansas..............	768,716	701,779	1,470,495	52.3	47.7
Minnesota...........	932,490	818,904	1,751,394	53.2	46.8
Nebraska	564,592	501,708	1,066,300	52.9	47.1
Oklahoma...........	214,359	183,972	398,331	53.8	46.2

The population in California did not increase as fast as immigration might seem to warrant, because of emigration from the State to new gold and silver deposits, and because a reaction in mining matters set in after about five years of rush and excitement. The mania had run its course and was abating. It was influenced slightly, too, by a counter attraction in the Appalachian mountains.

There began about this time a general search for gold throughout the eastern mountains. Many men engaged in it; and under the stimulus of Western excitement, mining, as well as prospecting, revived in the East, although the output was rather decreased at first by the movement westward and did not recover for ten years. Another reason why California's population grew slowly after 1853, is found in the compulsory exodus of a large number of Mexicans and half breeds to Mexico; an expulsion deemed necessary, because the lawlessness of the Mexican had been much aggravated by the conditions in which the mining had placed him; and made possible, because there had responded to the call to come West so many more men from the States than from the south. The foreign population from the south, however, was only expelled when its character made it an undesirable element.*

PROSPECTORS AND RUSHES. The development of mining evolved the prospectors, whose whole purpose seems to have been to roam about and unearth new deposits of treasure. They scattered from the camps up the sides of the gulches, across divides laterally and down into parallel valleys, or out at the upper ends of valleys and down the eastern Sierra slope. Thus other gulches and their contents became known. Men worked their claims, and told or wrote to their friends what they had found, or so described it that similar deposits were identified elsewhere. Other men came to visit the mines and camps, and after a little examination declared that they had the same kind of stuff at home, and forthwith proceeded to prove it. By these exploratory wanderings the extent of the gold fields of California became known.

The prospector wandered out of the State and into others, made magnificent finds, or told of finding magnificent things; and immediately there were swarms of men, urged by strong desire, who were ready to leave sure things for the possibility of something richer. By this means there arose many local or even inter-state migrations of considerable bodies of men. Whole camps became fired with something akin to the feeling in the bosom of the roving prospector, but differing in that they knew where they were going, while the prospector never knew. Hundreds of rushes of men from one gulch to another occurred, thus scattering the miners in all directions. Camps often sprung up, mushroom like, in a night, and flourished a few months or even a year or two, and then were left deserted and abandoned, because the builders had taken a new attack of the gold fever. While such frequent moves were usually disastrous to many of the participants, they were factors of progress; and their final result was an ever widening benefit to the state and society, because they increased knowledge both of land and mineral; they mixed men in their period of rapid transformation and prevented local sectionalism; they diffused knowledge of methods of mining and reducing the ores; they acquainted men with several conditions under which the ore occurred; and in many ways made for the improvement of the industry and the more uniform development of the whole western region.

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* Whitney, J. D. Metallic Wealth of the U. S., p. 137.

Examples of significant or extensive migrations by means of rushes are easily found and date from the beginning of the history of western gold mining. No sooner had the development of California's wealth gotten well under way than such emigration began. Sometimes, the particular provocation was a report of a promising bonanza, based on some prospector's discovered "traces of gold;" sometimes, it was a day's or week's hard luck in the home beds that sufficed to send forth the restless miner. In the Fraser River rush of 1858, 15,000 hardy men left California in four months, and other thousands later.* In the following year, thousands went to the Cariboo B. C.; and in 1860-1862, a multitude hastened to Idaho on the Clearwater and Salmon rivers. The Washoe rush occurred at the same time. During 1860-1862, Nevada sagebrush deserts and treeless mountains proved attractive, and California miners began to gather treasures from Humboldt, Esmeralda, etc. In 1862, a rush to Boise, Idaho, occurred;† in 1863, to Owyhee; in 1864, to Alturas; to Big Bend of the Columbia in 1865, and to White Pine in 1866. California lost to these regions in the last three or four of these years 30,000 to 40,000 men. Nor did all in each new place come from the one State; for the later rushes were made up in part of men who had become accustomed to rush, and in part of men fresh from the East, as well as of those who were leaving California for the first time. Rushing into new territory was not confined to the early days but continued down to the present century. Nor was it a feature of American mining; for Australia, in the fifties, had many wild, exciting rushes and occasional examples all along, until the famous West Australia excitements in the nineties, of which the Siberia rush was perhaps the most notable.‡ Klondike in the later nineties, and Nome in 1899 and 1900 with Thunder

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* Bancroft, H. H. Hist. of Calif., Vol. VII, pp. 682-3.

† Bancroft, H. H. Hist. of Wash., Idaho and Montana, pp. 406f; 418.

‡ Amer. Inst. Min. Eng., 1898, p. 496.

Mountain, Idaho, in 1001-2 bring the rush down nearly to the present. The surficial nature of the gold occurrence in placers seems directly responsible for this peculiar character of migrations. Quartz deposits do not elicit the phenomenon, because it takes capital and machinery to get anything out of them, and the single handed miner with rapid development ideas can do nothing. In this shifting about, many became discouraged with mining and turned to other occupations, as they found suitable localities for grazing or cultivating. Almost all occupations were recruited from among the miners, as they had contributed to that class.

Rushing not only gave an impetus to all the Western States, but by this form of migration miners overflowed into British Columbia and even into Northern Mexico, teaching the Mexicans better methods of working. They affiliated with them, fought Indians for them, and prepared the way for closer international relations.* The wandering miners even spread into South America, Alaska, Australia, and the Transvaal, from all of which our own Western States have now received miners; and carried with them their laws and customs as well as methods of working. Often the transported Yankee mining notions were unworkable in the new conditions; but the ingenuity, which responded to the former conditions, was again sufficient to devise something that would work, and so the diffusion of ideas went on working beneficence all the way as surely as did those Crusades of the olden days.

REFLEX WAVE OF MIGRATION. The fact that the first great discoveries of gold and silver in the United States were very near the western coast, and that subsequent disclosures were made at varying distances inland, led to the reflexing of the wave of migration and development. All focussed on California for a few years; then other discoveries were made, in Oregon in 1852, Washington in 1855,† with Arizona in 1858, Nevada in 1859, and Idaho in 1860 or 1862,‡ completing the semi-circle around the first State. Colorado, a little out of time, was found to be rich in gold in 1859 by men enroute to California; and there followed a rapid immigration from the West as well as from the East. Other valuable deposits were revealed in Idaho in 1861 and 1863. Montana started the second semi-circle in 1860 and 1862, and possibly in 1858, which New Mexico in 1860, and Utah in 1867 completed. Then came the outposts of South Dakota in 1876 and Alaska in 1880. The dates of admission to statehood confirm this truth and illustrate still further the influence of the mining industry. California, the first western State to receive the honor, entered the Union in 1850. Oregon and Nevada, two adjoining States, followed in 1859 and 1864, respectively. Although Utah's population was sufficient before 1870 to admit her with her semi-circle, for other reasons she was detained until 1896. In 1889 and 1890, the second semi-circle, begun abnormally by Colorado in 1876 (already an important mining State), was completed by the admission of Wyoming, Montana, Idaho and Washington. South Dakota was admitted in 1889, also, but not primarily on account of the mining population. Arizona, due in the sixties, and New Mexico due with Idaho and Wyoming, did not gain statehood until a very recent date. Their interests, although mostly mining, were relatively slight; and their populations consisted, beside the miners, mostly of Mexicans and Indians. As the widening waves of discovery spread from California as a center, so the wave of migration set in the same direction; and in the course of thirty years, with constant additions from the East, had beaten back across all the mountains, setting in motion the machinery of development in every State.*

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* Shinn, C. H. Mining Camps, pp. 291-2.

† Bancroft, H. H. Hist. of Wash., Idaho and Mont., p. 108.

‡ *Ibid.*, p. 406. Eggleston, Edw. United States and Its People, 1888, pp. 75-77.

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* Chittenden, H. M. Early Steamboat Navigation on The Missouri River, 1903, Vol. II, pp. 265f.

THE GEOLOGY OF THE LAKE SUPERIOR REGION. A REVIEW*

The Lake Superior Region, noted as a producer both of iron and copper, has been more thoroughly studied than any other area of equal size in the United States. Among those who have worked on some part of the region are a large proportion of the leading geologists of America and also some from Europe.

Since early in the Nineteenth Century, geological surveys, under national, state or private supervision, have usually been in progress. The literature on this region is accordingly so enormous that it is difficult for a student to become familiar with all of it. It is therefore of prime importance to have an analysis of the phenomena and problems of the region as far as it is now understood. This monograph is the first attempt to discuss the region as a whole and, naturally enough, it appears under the auspices of the United States Geological Survey, and has been prepared by the two authors who have been most continuously connected with Lake Superior geological study.

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* The Geology of the Lake Superior Region. By Charles Richard Van Hise and Charles Kenneth Leith. 641 pp., 49 pls., 76 figs. *Monographs* of the U. S. Geol. Surv., Vol. 52, 1911. Washington. 11½ x 9½.

The Lake Superior region, as represented on the accompanying geological map, includes 180,000 square miles. It occupies a part of the southern margin of the great pre-Cambrian shield of northern North America, bordered and overlapped on the south and southwest by later sedimentary rocks. Although the area included in the monograph is so extensive, the portion of most interest is far smaller, for the iron and copper deposits are found only in these pre-Cambrian rocks, and occupy an area of less than 3 per cent of the Lake Superior region. As the authors point out: "The great development of the mineral industry in this region has afforded the geologists unusual opportunity for study... This fortunate combination of a field containing an exceptionally full record of a little-known part of the geologic column with the means of studying it has warranted the study of the pre-Cambrian with a degree of detail that has been practicable in but few other significant pre-Cambrian regions."

A chapter on the history of the region contains an outline of the development of each district, and tables of output. We learn from these that, up to the end of 1909, there had been shipped 449,656,472 gross tons of iron ore, nearly half of which came from the Mesabi range. The third chapter contains a brief history of the geological work and includes a full bibliography.

The authors have been assisted by several associates, particularly Lawrence Martin and W. J. Mead. Professor Martin contributes Chapters 4 and 16 on the Physical Geography and the Pleistocene respectively. The chapter on Physical Geography, illustrated by sketch maps and an excellent relief model, not only summarizes the results previously published, but, in some respects, contributes a new point of view concerning a region of unusual interest. In this chapter the region is divided into three provinces: (1) the Lake Superior Highlands; (2) the semi-circle of lowland plain; (3) the Lake Superior district; and each of these provinces is separately described.

The highlands form a remarkably even peneplain with a general elevation of from 1,000 to 1,700 feet, though with monadnocks which rise to a height of a little over 2,300 feet. This peneplain is described and its erosive features, such as ridges, mesas, monadnocks and valleys, are discussed and interpreted. Perhaps in late Algonkin or early Cambrian time, the peneplain was, in part at least, buried beneath sedimentary deposits and later resurrected. It was, moreover, subjected to warping.

Encircling this highland region on the south, east and west, are horizontal, or nearly horizontal, early Paleozoic strata; and towards the west, Cretaceous strata, the whole forming a belted plain, whose topography is more or less obscured by glacial deposit.

Sunk partly in the lowland belt, but chiefly in the pre-Cambrian highland area, is the basin of Lake Superior, which everywhere, except on the southeast side, is bordered by an escarpment that rises sometimes directly out of the water, sometimes at a distance back from the shore. It rises from 400 to 800 feet above the lake surface, and sinks from 500 to 900 feet below the water.

In considering the origin of this basin, Professor Martin points out that Lake Superior is unlike the other Great Lakes, in that it lies not along the contact between pre-Cambrian and Paleozoic rocks, but in the pre-Cambrian everywhere excepting in the southeast. While admitting the synclinal structure of the Lake Superior basin, he questions the old explanation that the basin is due to this down-folding, for, as he points out, such an old structural basin could neither have remained unfilled for so long a time, nor could it have retained the present abrupt boundaries which bear all the characteristics of topographic youth. He adduces evidence which seems to show that the bounding escarpments are due to faulting, and concludes that the Lake Superior Basin is a *graben,* due either to recent faulting or, more probably, to ancient faults whose escarpments have been buried beneath sedimentary strata and resurrected by later denudation. He holds that glaciation has modified the topographic features only in minor detail.

Chapters 5 to 15 include a painstaking outline of the main features previously worked out in the various ore fields. While these chapters are of much importance they are of particular interest to the local student, the structural and economic geologist, and the miner rather than to the geographer.

Chapter 16, by Professor Martin, discusses the Pleistocene phenomena, describing features of deposit and giving an interpretation of the glacial history. The glacial invasion stripped off the soil in the region north of Lake Superior while south of the lake a heavy mantle of glacial deposit was left. The "influence of glaciation on topography was minor" in importance, but "the effects on soil, drainage, forests, and the subsequent pursuits of man were most profound." The nature of these influences and the various kinds of deposits are discussed and the chapter includes an outline of the history of the expanded marginal lakes associated with the ice recession.

In Chapter 17, which deals with the iron ores, there is a discussion by the authors and W. J. Mead, of the characteristics of the ores and the methods of exploration employed in locating them. These methods include drilling. Not less than 26,500 drill holes have been put down, making a total of 1,363 miles of drilling, at a cost of $21,600,000. Dr. Leith has gained high skill in the study of drill cores, and their interpretation and his remarks upon the significance of drill records are of special importance.

Up to 1910, 335 mines have been worked, and it is estimated that 20.5 per cent. of the known reserves have already been consumed. About 1,905,000,000 tons of ore are estimated to be at present available, 1,600,000,000 tons of it in the

Mesabi range. If this estimate is correct, and if the rate of mining in 1910 should be maintained, the available ores would be exhausted in forty-five years, or in 1956. This estimate is not to be taken too rigidly, for there are variable factors. There is the probability of new ore discoveries, of the use of larger proportions of low grade ores, and of decrease in output, due to a greater use of deposits in other regions. These tendencies toward reduction in rate of exhaustion are opposed to the other tendency toward increase in shipment, through increased industrial demands. No accurate prophecy can be made concerning the future of the Lake Superior iron production. It is to be noted that "prior to 1911 the discoveries have kept well ahead of the shipments"; but it is hardly probable that this will be maintained for very long in the future. In view of the fact that the Lake Superior region produces about 80 per cent. of our iron ore and contains approximately 60 per cent. of the reserves now known to be available, the question of the future of the Lake Superior region is naturally one of the greatest importance." The authors conclude that "while the ores at present available would probably be exhausted within about fifty years if they alone were drawn from, the increasing use of lower-grade ores, already begun, will lengthen this period many times."

In 1907 the average cost of carrying the ore from the upper to the lower lake ports, was 72.16 cents per ton, and the average cost of transportation to the furnaces, $2.14 per ton.

Messrs. Van Hise and Leith hold that the ores are altered parts of chemically deposited sedimentary formations, a few representing originally rich layers that were subjected to only minor secondary change, but most of them underwent extensive secondary concentration, which was, in fact, "the essential means of enriching iron-formation layers to iron ores." The original source of the iron was mainly basic igneous rocks, the iron being removed and later concentrated by meteoric waters, whose activities have been localized by a considerable variety of structural and topographic features, the development of the ore representing a partial metamorphic cycle. The discussion terminates with a genetic classification of the iron ores of the world.

The closing chapters deal respectively with copper in Chapter 18, silver and gold ore in Chapter 19, and general geology in Chapter 20. This monograph will long stand as an adequate discussion of the complex phenomena of a unique region.

RALPH S. TARR.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

ANNUAL MEETING OF THE SOCIETY. The annual meeting of the Society was held at the Engineering Societies' Building, No. 29 West 39th Street, on Tuesday, January 23, 1912, at 8.30 P. M.

Vice-President Greenough in the Chair.

REPORT OF THE COUNCIL

The Annual Report of the Council was presented and read by its Recording Secretary, Mr. Levi Holbrook:

January 18, 1912.

To the American Geographical Society:

The Council respectfully submits the following report for the year 1911:

The number of Fellows on January 1st was 1,210. The additions have been 63; the losses by death, resignation, etc., 100; and the total Fellowship on December 31st was 1,173, of which number 371 were Life Fellows.

There have been added to the Library 743 books, 2,935 periodicals and pamphlets, 350 maps and charts, and 23 atlases.

There were published in the *Bulletin* besides the Geographical Record, the Book Reviews, Map Notices, and Bibliographical Lists, fifty-two papers, all but four of which were original contributions. The Index to the volume for 1911, over 100 pages in length, is a comprehensive record of the geographical literature and cartographic products added to the library and map room during the year.

Six meetings of the Society were held, at which addresses were made by William Edgar Geil, Mrs. Charles Schaeffer, Arthur Stanley Riggs, John Green Brady, Charles E. Fay and Walter McClintock.

The Cullum Geographical medal has been awarded to Jean B. E. A. Charcot for explorations and surveys in West Antarctica which have added much to geographical knowledge.

The Society's collection of maps and appliances used by teachers of geography in European schools has been exhibited during the year at various points in Missouri, New York, Massachusetts and Michigan. The exhibitions continue to be successful in their educational influence, and the collection will be kept in circulation so long as there is demand for it.

Soon after the opening of the year, Mr. Archer M. Huntington felt it necessary, for personal reasons, to resign the active presidency of the Society, his interest in it remaining, happily, undiminished. The Council in November elected him Honorary President, such action being permitted by the By-Laws in the case of persons who have rendered distinguished and valuable service to the Society.

Early in the summer, the office, library and possessions of the Society were transferred to its new fire-proof building on Broadway at 156th Street. This building, the land on which it stands, and all expenses incident to the change from 81st Street, come to the Society as a free and clear gift from present and former members of the Council, none of the general funds being drawn upon, even for furnishings, etc.

The property No. 15 West 81st Street has been sold at the very satisfactory price of $175,000 and its proceeds invested at interest; the whole income becoming available for the general purposes of the Society.

The Society plans to commemorate the sixtieth anniversary of its foundation and the first of its installation in its new home, by a geographical excursion across the American continent, to be managed and led by Professor William Morris Davis of Harvard University. For information concerning this excursion, its object, plan, scope and progress, reference is respectfuly made to the *Bulletin,* where details will be given from time to time.

For the condition of the finances reference is made to the report of the Treasurer, herewith appended.

All of which is respectfully submitted.

CHANDLER ROBBINS,
Chairman.

LEVI HOLBROOK,
Secretary.

REPORT OF THE TREASURER

The report of the Treasurer, Mr. Henry Parish, Jr., for the year 1911, was read by Vice-President Greenough as follows:

GENERAL ACCOUNT

The Treasurer respectfully reports:

On January 1st, 1911, there was on hand a balance of..			$461.74
During the year there have been received for Fellowship Dues, Sales of Publications, Interest on Investments, &c., &c.		$26,971.93	
Mortgages paid off in part		$875.00	
Proceeds of the property:			
No. 15 West 81st Street	$175,000		
less remaining on mortgage	$125,000	$50,000.00	$77,846.93
Total			$78,308.67
There have been expended for Salaries, Meetings, Library, Publications, House Expenses, Insurance, Postage, &c.		$26,749.79	
Invested in guaranteed mortgages		$50,000.00	$76,749.79
Leaving a balance on hand December 30, 1911.			$1,558.88

REPORT OF THE NOMINATING COMMITTEE

The Special Committee appointed Nov. 16, 1911, to nominate and recommend to the Society suitable persons to be elected in January, 1912, to fill vacancies then existing in its offices, report that they recommend the election of the following named persons to the offices designated.

Vice-President, ANTON A. RAVEN, term expiring in 1915
Treasurer, HENRY PARISH, JR., " " 1913
Foreign Corresponding Secretary, WILLIAM LIBBEY, " " 1915
Councillors, FRANCIS M. BACON,
BANYER CLARKSON,
GEORGE W. FOLSOM, } " 1915
CHANDLER ROBBINS,
PAUL M. WARBURG,

[Signed.] JOHN GREENOUGH,
ARCHIBALD D. RUSSELL, } *Committee.*
HAMILTON FISH KEAN,

The vote of the Society was unanimously in favor of the persons recommended by the Council and they were declared duly elected.

Vice-President Greenough then introduced the speaker of the evening, Charles Wellington Furlong, who addressed the Society on "Tripoli the Gateway to the Sahara." Various aspects of the city of Tripoli, the oases and the desert were illustrated by many lantern slides.

The Society then adjourned.

Award of the Cullum Medal to Dr. Charcot. The Annual Report of the Council (p. 116) announces the award of the Cullum Geographical Medal to Dr. Charcot for his explorations and surveys in West Antarctica. This recognition by the American Geographical Society of the notable service to science and exploration rendered by Dr. Charcot have been commented upon with hearty approval by many newspapers of America and Europe.

AMERICA

Association of American Geographers. The Eighth Annual Meeting of the Association was held in Washington, Dec. 28-30, 1911. Through the kindness of the National Geographic Society, the sessions were held in Hubbard Memorial Hall. The President, Professor Ralph S. Tarr of Cornell University, presided, and gave the president's address. His subject was, "The Glaciers and Glaciation of Alaska." Professor Martin read a memorial of Professor Christopher Webber Hall, who died on May 10, 1911. In addition to these addresses, thirty-six papers were read by members and by several others, on invitation. Papers on subjects in Meteorology were more numerous than at any previous meeting of the Association.

On Friday evening the Association met with the Geological Society of America to hear the address of its president, Professor W. M. Davis, upon the subject, "The Relations of Geology and Geography." This was followed by a social reunion given to both societies at the Cosmos Club by the Geological Society of Washington.

The first volume of the *Annals* of the Association is now in press and will appear during the winter under the editorship of Professor R. E. Dodge.

Announcement was made of the election of the following officers for the year 1912: President, Rollin D. Salisbury; First Vice-President, Martin R. Campbell; Second Vice-President, Isaiah Bowman; Secretary, Albert Perry Brigham; Treasurer, Nevin M. Fenneman; Councillor for three years, Lawrence Martin. The next annual meeting will be held in New Haven.

THE IDAHO-WASHINGTON BOUNDARY. The boundary line between Idaho and Washington has been resurveyed by the U. S. Geological Survey, as the markings of the survey of 1873 had become largely obliterated and much of the country is now being settled. Bulletin 466 of the Survey by R. B. Marshall, Chief Geographer, is a report of the work. The report contains some of the field notes of Roland J. Reeves the original surveyor, who gave an account of the difficulties and hardships encountered in 1873 in traversing this country, much of which is now well-settled and highly prosperous. The boundary line runs through rolling agricultural and fruit country where the work was easy and also through heavily timbered mountains where continuous chopping was necessary. New posts of wrought iron were set at every mile and at every five miles were planted granite monuments with the words "Idaho" and "Washington" chiseled on their respective sides.

DR. L. A. BAUER RETURNS TO WASHINGTON. Dr. Bauer is at home from a nine months' trip of inspection of the magnetic work which is being conducted on board the *Carnegie* in the Indian and Pacific Oceans and by land expeditions in Australia and Asia. He also visited the magnetic institutions in the Pacific Islands, New Zealand, Australia, India, Burma, Java, China and Japan.

GEOGRAPHICAL SOCIETY IN MINNESOTA. A Minnesota Geographical Society has been organized at the State University, Minneapolis. Prof. Edward M. Lehnerts, of the Department of Geology and Geography, is President and Prof. F. C. Miller of the St. Paul Central High School is Secretary-Treasurer. It was proposed at the first meeting to organize a series of geographical excursions in and around the Twin cities and a committee was appointed to plan the excursions.

THE U. S. TOPOGRAPHIC SURVEY. During the fiscal year ending June 30, 1911, 23,272 square miles of the United States were topographically surveyed by the United States Geological Survey and 6,460 square miles revised, or resurveyed, making a total of 29,732 square miles. About 37 per cent. of the entire United States, exclusive of Alaska, has now been thus surveyed. These surveys are represented by more than 2,000 separate sheets.

CLASSIFICATION OF THE PUBLIC DOMAIN. During the last five years about 206,348,809 acres have been classified by the U. S. Geological Survey, and 75,239,198 acres additional have been withdrawn from public entry.

Of these areas, coal classifications covered 15,621,429 acres; classification of metalliferous land, 288,465 acres; and designation of lands enterable under the 320-acre and Enlarged Homestead Act, 190,438,915 acres. There have been withdrawn during this period 67,724,918 acres of coal-bearing land, 3,394,914 acres of oil land, 2,396,391 acres of phosphate land, and 1,722,975 acres of land believed to be valuable for the development of water power.

AFRICA

RAILROAD AT EL OBEID. The rails connecting El Obeid, the capital of Kordofan, with the Nile South of Khartum reached that city on Dec. 2, 1911. Twenty-eight years ago, the Mahdi entered El Obeid and commanded the well-to-do class, under penalty of death, to leave their brick houses and live in tents or huts of branches so that no exterior sign should bear witness to any inequality among Mohammedans, "who are all sons of God." All the years of the Mahdist supremacy were lean years for El Obeid, whose population dropped from 30,000 to about 5,000, and to-day, it is only 12,000. But when the new road is opened for business, a new era is expected to dawn for El Obeid. The town is coming into touch, by steam rail, river and sea routes, with Khartum, Cairo and Europe. All Kordofan is beginning to feel the impulse of the new era of agricultural and commercial progress ushered in by the Khartum government; and no town in this province is so favorably situated for great growth and development as El Obeid.

The town stands in the part of Kordofan where rainfall is most abundant. Heat is less overpowering here because El Obeid stands on a plateau over 2,000 feet above the sea; and no town west of the Nile is the center of so many caravan routes. El Obeid was the only town in the Egyptian Sudan which, under the Mahdist régime, was still in some sort of touch with the outside world. The few things it still had to sell were sent west through Wadai and across the Sahara to Tripoli; and now the Anglo-Egyptian government has sent its workmen over scores of long routes radiating from the town, cleared them of scrub and other impediments to travel and fitted them to be feeders for the railroad and distributors of the imports which the new highway will bring to the capital.

Kordofan is now yielding to the government revenues that are nearly double the cost of the annual administration of the province; and its prosperity will certainly be much enhanced by the railroad to Senaar and Khartum which will partly replace and partly supplement the camels, pack bulls and donkeys that are now the only means of transportation.

HOMES FOR WHITE MEN IN AFRICA. Another region in tropical Africa has just been declared to be adapted for settlement by European farmers. In the center of Northern Nigeria, a British Protectorate more than four times as large as our state, are the Bauchi highlands, on whose flanks, most of the drainage of the Protectorate has its sources. It is the last part of Northern Nigeria to be explored, because the large native population were wild and hostile. The British did not enter these highlands till about five years ago and then only when they had reason to believe from ore which the natives brought out that it was rich in tin. The British then occupied these highlands and the natives are now supplying vegetable food for the whites and working in the mines. It has been proven that the Bauchi region is one of the greatest sources of tin.

The death rate among the whites there has, thus far, been about twenty per thousand a year, which is the normal rate in most temperate countries. About 600 miles north of the equator, in the latitude of Costa Rica and the central Philippines, at an altitude of 3,000 to 4,000 feet above the sea, this land is declared to be a "splendid wheat-growing country." Mr. Huddart, recently Director of Mines, Mr. Lush, Mr. Tomson and other well-known mining authorities are among those who testify that the Bauchi plateau is a healthful and fertile district where "any kind of vegetable grows well especially the English varieties," where "living is cheap, there being plenty of beef, mutton, fowls, milk, eggs, etc.," and where "the nights are quite cold, and any man who lives well ought to have perfect health." White settlement by farmers is not yet invited. A branch railroad from the Baro-Kano line will soon be extended to this plateau. Up to this time, six large, high districts in tropical Africa have been declared to be fitted, by temperature and fertility, to be the homes of European peasantry. (Based on "Nigeria and Its Tin Fields," by A. F. Calvert.)

Dr. Hans Meyer's East African Expedition. *The Mitteilungen aus den Deutschen Schutzgebieten* (1911, Nos. 4 and 5) printed a series of letters from Dr. Meyer describing his explorations in the region west of the Victoria Nyanza including Ruanda and the Kirunga Volcanoes. From the German port of Bukoba on the west coast of Victoria Nyanza, his party went westward to Lake Ikimba, whose shape, it was found, had been considerably altered since Capt. Herrmann's survey, the open water stretching farther west, while a swampy tract not shown on the maps extends it still farther. This lake lies at the foot of the eastern plateau, which ends in a steep regular wall over 700 ft. high, running along the eastern and southern shore of the lake, and then strikes southward to Lake Burigi (called Urigi on the present maps), which was afterwards visited. Another escarpment twenty miles to the west forms the edge of the Karagwe Plateau. Between the two lies the depressed land of Ihangiro, a bush-covered wilderness, in which these two lakes are situated. Soundings show that Lake Burigi occupies quite a shallow basin. Passing through eastern Ruanda the party found that this is almost a treeless country, an original plateau dissected by erosion into long regular ridges divided by swampy valleys. A new lake called by the natives Kihonda stretches east and west across a depression twelve miles wide and about 1,000 feet below the surface of the plateau, with many bays and islands.

An interesting country partly unexplored formed by the clay-slate mountain system of northern Ruanda was crossed on the way to the Kirunga volcanoes. This old plateau is furrowed by longitudinal valleys and culminates in a semicircle of mountains, rising in Mt. Kabuji to an altitude of 8,530 feet. This is a grass land with a surprising extent of terrace cultivation, many of the population living miles away from water, the carriage of which involves enormous labor. There are many native paths, but almost no export of produce. This region slopes northward to the great lava tract formed by the outpourings from the volcanoes. Prof. Meyer ascended the highest volcano, Karisimbi and also Niragongo, now in a state of activity. He explored the islands in Lake Kivu, the largest of which he says bears the name of Ijwi, which is not the name now appearing on the maps.

On the way south to Tanganyika, the unexplored region to the southwest of Isawi was studied. The Muvisi range, hitherto supposed to be uninhabited, was found to be well-peopled and cultivated. The route led over the Rusiga to the source of the Ruvuvu, which Baumann, its discoverer, regarded as the true source of the Nile. The whole Tanganyika region was found to be suffering greatly from sleeping sickness, though the utmost efforts are being made to stop its ravages. Dr. Meyer's last letter, written from Daressalem, contains a sketch of the physical, ethnographic and economic relations of the districts traversed. He says it is very important to extend the German Central R.R. to Ujiji and to open communications from that lake port to the north of Tanganyika by steamer. This would afford the best route to the highlands of western Ruanda and Urundi, which is known as a "white man's" country, where settlement by Germans is now advocated.

BUSINESS OF THE SUEZ CANAL IN 1911. In the past year 4,969 ships (25,417,852 gross and 18,324,794 net tonnage) passed through the Suez Canal; also 1667 smaller vessels (32,911 net tonnage). The total receipts of the canal were $26,952,400. (*Le Canal de Suez,* Jan. 22, 1912.)

ASIA

THE SANGPO-BRAHMAPUTRA PROBLEM. It is expected that this year the unexplored stretch of the Sangpo-Brahmaputra, where the river passes from the known Sangpo of Tibet through the Himalayas to the plain of the Brahmaputra in Assam, will be surveyed, and otherwise studied. The military expedition sent by the Indian government to punish the Abor tribe which killed Commissioner Williamson last year and has long prevented the exploration of the unknown part of the river, is accompanied by a number of scientists and topographers. Capt. Trenchard and Lieut. Oakes will have charge of the survey of the unknown part of the river. Botanical, zoological and anthropological investigations will also be made.

POLAR

BRITISH AND AUSTRALIAN EXPEDITIONS. The *Terra Nova* sailed from Christchurch, New Zealand, on Dec. 14, for Capt. Scott's base station in MacMurdo Sound.

Dr. Mawson's Expedition sailed from Hobart, Tasmania, on the *Aurora* on Dec. 2 and after a rough passage of over a fortnight arrived at Macquarie Island all well. This island is about half way between Hobart and the coast of Wilkes Land, on which the Australian Expedition expects to begin to work. It is said that the arrival of the party at Macquarie Island was announced by wireless telegraph, an instalment of which forms a part of Dr. Mawson's equipment. (*Geogr. Journ.,* Feb., 1912, p. 162.)

THE FILCHNER EXPEDITION. A letter has been received in Germany from Dr. Filchner, the leader of the German Antarctic Expedition dated Grytviken, South Georgia, Dec. 9, 1911. He said that on the following morning he and his party would sail, taking a course due south till they reached the northern edge of the pack ice, which they would follow to the east till they should find an opening that they could use to get farther south to the Coats Land region. (*Zeitschr. Gesell. f. Erdk. zu Berlin,* No. 1, 1912).

THE NORWEGIAN EXPEDITION IN SPITZBERGEN. *La Géographie* (Oct., 1911) gives a short account by M. A. Hoel of the work of the Norwegian Expedition which visited that archipelago last summer to continue the topographical and geological surveys carried on in previous years. Though the weather was very unfavorable for surveying, sufficient data were obtained for the making of a complete topographical map of the region between Ice Fiord and Bell Sound. A geological map of the region between the north and south sides of the Spitzberg, Wijde Bay, and Ice Fiord was also made. Photogrammetric methods were largely employed.

ECONOMIC GEOGRAPHY

WORLD'S COAL PRODUCTION. According to statistics collected by the U. S. Geological Survey and published in its *Press Bulletin* the world's coal production in 1910 was about 1,300,000,000 short tons of which the United States contributed about 39 per cent. The following table shows the coal production in short tons of the principal countries in 1910, except in those cases where the figures for 1909 were alone available:

United States (1910)	501,596,378
Great Britain (1910)	296,007,699
Germany (1910)	245,043,120
Austria-Hungary (1909)	54,573,788
France (1910)	42,516,232
Belgium (1910)	26,374,986
Russia and Finland (1910)	24,967,095
Japan (1909)	16,505,418
Canada ([illegible])	12,7[illegible],512
China (1909)	13,227,600
India (1909)	13,294,528
New South Wales (1909)	7,862,264
Spain ([illegible])	4,54[illegible],713
Transvaal ([illegible])	4,44[illegible],477
Natal ([illegible])	2,57[illegible]12
New Zealand (1909)	2,140,597
Mexico (1909)	1,432,990
Holland (1909)	1,235,515
Queensland and Victoria	1,119,708
Italy (1909)	611,857
Sweden ([illegible])	272,[illegible]56
Cape Colony (1909)	103,519
Tasmania (1909)	93,845
Other countries	5,2[illegible]003
Total	1,278,577,812
Percentage of the United States	39.2

PHYSICAL GEOGRAPHY

THERMAL MAPS. At the Portsmouth meeting of the British Association in August, Prof. A. J. Herbertson read a paper on "Thermal Maps," in which he said that the ordinary maps of the meteorologists were not of much practical use to the geographer, who wanted a map showing the actual temperature at the bottom of the atmosphere and not that over an ideal surface. He discussed the various difficulties in the way of the preparation of such maps, and showed mean actual temperatures for January and July at the bottom of the atmosphere. From these, with certain corrections for the intertropical regions, he had prepared a map, with the assistance of some pupils, showing the natural thermal divisions of the earth's surface. As showing the value of such a map, he pointed out that it removed the popular misconception that the heating of Tibet caused the monsoons of India. The map was of great theoretical and practical value in giving the geographer precise data for a study of the thermal quality of the atmosphere in different parts of the world and in giving to colonists and others an accurate picture of the mean thermal conditions at the opposite seasons of the year in the countries in which they were interested. (*Scott. Geogr. Mag.*, Vol. XXVII, No. 10, 1911, p. 517.)

PRE-GLACIAL SHORELINES IN SCOTLAND. In the western islands of Scotland are pre-glacial shore-lines, described by Wright (Wright, W. B., *Geological Magazine*, New Series, Decade V, Vol. VIII, 1911, pp. 97-109). The pre-glacial sea-cliffs and rock benches are distinguished from the two well-marked post-glacial strands of Scotland by the presence of glacial till, overlying striae, upon the bedrock of their surfaces. They occur at heights of from 95 to 125 feet. These proofs of the elevation of the British Isles before the glacial period have long been recognized in the southern half of Great Britain but not previously in Scotland. They furnish important evidence that, before the ice age, the outlines of the British Isles were not significantly different from the present shape.
LAWRENCE MARTIN.

CONGRESSES

THE TENTH INTERNATIONAL GEOGRAPHICAL CONGRESS. The *Scottish Geographical Magazine* says that a letter received by one of its officers from the Secretary of the Tenth International Geographical Congress, which was postponed last fall till next spring, has now been indefinitely postponed, though it is expected that the Congress will be held in Rome as soon as circumstances will permit.

EIGHTEENTH INTERNATIONAL CONGRESS OF AMERICANISTS. The eighteenth session of this Congress will be held in London, at the invitation of the Royal Anthropological Institute, from May 27th to June 12th, at the Imperial Institute. The leading topics to be discussed at the Congress are:

(*a*) The Native races of America; their origin, distribution, history, physical characteristics, languages, customs and religions.

(*b*) The ancient monuments and the archæology of America.

(*c*) History of the Discovery and European occupation of the New World. The languages admitted are English, German, French, Italian, Spanish and Portuguese. An archæological and ethnological exhibition will be held at the Imperial Institute. Sir Clements R. Markham is President of the Congress.

CONGRÈS INTERNATIONAL D'ANTHROPOLOGIE ET D'ARCHÉOLOGIE PRÉHISTORIQUES. The fourteenth session of this Congress will be held at Geneva, Switzerland, in the first week of September, 1912.

OBITUARY

CLARENCE EDWARD DUTTON. Major Clarence Edward Dutton, U. S. A., retired, died at Englewood, N. J., on Jan. 4, at the age of 70 years. He was long detailed for duty in the U. S. Geological Survey and was eminent for his contribution on volcanoes and earthquakes and for the results of his geographical studies. Among his writings were: High Plateaus of Utah, 1878; Tertiary History of the Grand Cañon District, 1881; Mt. Taylor and the Zuñi Plateau, 1884; the Charleston Earthquake, 1887; and a book, Earthquakes, 1904.

SIR JOSEPH DALTON HOOKER. This eminent English botanist died on Dec. 11, aged 95 years. When he was 21 years old he was assistant surgeon on board the *Erebus* on Sir James Ross's expedition to the Antarctic. When thirty years old he traveled extensively in the Himalayas studying the flora of that region and later he made other botanical expeditions to the east. In 1865 he became director of the Kew Gardens succeeding his father Sir William Hooker, in that position. The results of his discoveries in botany and his many contributions to that study gave him great distinction as a man of science.

R. E. YOUNG. Robert Evans Young, D. L. S., Chief Geographer of the Interior Department, Dominion of Canada, and Superintendent of the Lands Division, Department of the Interior, recently died at Ottawa, aged fifty years. For twenty years he was engaged in the land surveys of Manitoba and British Columbia and in 1904 he made a special survey of the City of Winnipeg. He was appointed Chief Geographer in 1909. Much of his attention has recently been given to the collection of data relating to the economic prospects of regions to the north of Alberta and Saskatchewan. In "Canada's Fertile Northland" and similar works with whose preparation he had much to do, he helped to attract wide attention to the vast heritage of the Dominion to the north of the regions now developing.

FREDERIC COPE WHITEHOUSE. Mr. Whitehouse died in this city on Nov. 16, 1911. A graduate of Columbia University in 1861, he studied later in France, Germany and Italy. He became known to geographers through his discovery in 1882 of the depression in the Libyan Desert known as the Wadi Raiyan and wrote many papers on the practicability of utilizing it as a reservoir for the storage of Nile waters during the flood periods. His researches in Semitic traditions resulted, he believed, in the identification of the "Land of Goshen" with the present Fayoum which was submerged in the time of Herodotus and was then known as Lake Moeris.

GENERAL

THE AIRSHIP IN EXPLORATION. Professor Dr. H. Hergesell deems it probable that before many years the Zeppelin airship will serve a useful purpose in exploration (*Pet. Mitt.,* Vol. 57, Nov. 1911, p. 241). The improvements in 1911, he writes, have gone some ways to make the Zeppelin ship a practical and safe means of air navigation. The *Schwaben* made over a hundred trips in 1911 without an accident. It has three motors of the new type and on no occasion did the propelling machinery meet with any impairment of its service. The construction of the motors and propellers has been so far perfected that there is now practically no danger that these parts of the ship can be impaired so as to involve it in peril. The Zeppelin ships are being driven at the rate of 45 miles an hour and this increased speed has eliminated the danger from sudden gusts or strong adverse winds. From first to last no storm has yet destroyed a Zeppelin airship in the free air. Another idea that is being worked out is the practical and commodious housing of large airships. One of these structures, now being erected at Hamburg, promises to be suitable for the quick and easy storage of these vessels. The art of air navigation, he says, is still in its primary stage, but he looks for steady progress in the technical evolution of the new art. A problem now claiming attention is how to assure buoyancy in the free air for at least 48 hours while driving at full speed. When this problem is solved and also some other questions relating to the methods, the safety and comfort of air navigation, it will be possible at the present rate of speed, to cross North America in its broadest part in two and a half days and to reach unexplored land areas of the Arctic from Germany in less than a day and a half. He adds that Arctic exploration, by means of airships, will, of course, never be initiated till air navigation is a practical business like that of sea navigation.

FROST CARTRIDGES. "Frost lighting" is one of the most interesting of man's numerous efforts to protect himself and his crops against unfavorable weather conditions. In many sections of the United States ingenious and very effective methods of frost protection have been employed. In California, in particular, frost fighting has been carried to a high degree of scientific development. The careful experiments made there by Professor A. G. McAdie, for the United States Weather Bureau at San Francisco, have been of immense economic benefit to the fruit-growers of the Pacific coast. Professor McAdie has recently devised a new form of heater which has certain advantages over the old-style open fire, and also over the later forms of orchard heaters. It is called a "frost cartridge," and consists of a cylindrical tube, made of heavy cardboard or other slow-burning material, filled with a mixture of crude oil, gravel and sawdust. The ends of the tube are closed with stoppers. The cartridge is suspended by a wire horizontally, about three feet below the fruit. The fire is started by removing the stoppers and applying a torch to small amounts of cotton waste, previously soaked in kerosene, placed at the ends of the cartridge * * * (*Monthly Weather Review,* April, 1911). R. DeC. Ward.

Professor Cleveland Abbe honored. The Council of the Royal Meteorological Society has awarded the Symons Gold Medal to Professor Cleveland Abbe, of the United States Weather Bureau, in recognition of the valuable work which he has done in connection with meteorological science. The Medal was presented at the Annual Meeting of the Society on Jan. 17th.

COMMUNICATION

Toledo, Ohio, Jan. 18th, 1912.

Editor Bulletin of the American Geographical Society:

Sir: In the August, 1911, number of the *Bulletin* (pp. 625-626) appears a very uncomplimentary review of "Argentina and Her People of Today." As the writer of that book I can not let this review pass unnoticed in a periodical of such high standing. After quoting several alleged inaccuracies, the reviewer says the book is "worth little" except for a "hundred pages of history," because "statements are made so recklessly that no data may be trusted." In only one instance cited does the writer admit this error, and that is as to the relative position of Argentina as a producer of wheat. Albert Hale, a conservative writer, and recognized authority on South America, says in "The South Americans" (p. 89): "It is safe to say 500,000,000 acres can some day be turned to cultivation." This is in harmony with an Argentine authority that I followed. The figures quoted by the reviewer would allow less than one-third of the area of Argentina suited to agriculture, which is undoubtedly in error, and "a half billion of acres of fertile arable land," as given in my book, is nearer the truth. Dr. Hale also says (p. 91): "Only a few feet below the surface (middle Argentina) water can be found for live wells or windmills." In a publication issued by the Department of Commerce and Labor at Washington, in 1906, by Lincoln Hutchinson, and entitled "Report on Trade Conditions in Argentina, Paraguay and Uruguay," the temperature appears practically as in my book, and the Ohio Valley is given as one comparison. The historical incident of the "Reconquista" is explained in full on pages 307-9, in a way historically correct. The "rain of fish" is not given as a scientific fact, but is qualified by "it is claimed." In "Modern Argentina," by W. H. Koebel, and "Eight Months on the Gran Chaco," by Juan Pelleschi, this phenonenon is given in all seriousness. Regarding the "column of sheep" all I have to say is that the statement was certainly conservative, and not "reckless." It answered the intended purpose of a concrete illustration. The reference to Patagonia is simply an interpretation of language, and the paragraph in the book speaks for itself. These are the only "reckless statements" cited by the reviewer. I leave the judgment with any impartial reader. Nevin O. Winter.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Forest Physiography. Physiography of the United States and Principles of Soils in Relation to Forestry. By Isaiah Bowman. xxii and 759 pp. Maps, illustrations, appendix and index. John Wiley & Sons, New York, 1911. $5. 9½ x 6½.

This is an admirable work and fills a gap in American geographic literature that has been hitherto quite unbridged. Six hundred of its 700 odd pages are occupied by a description of the surface of the United States from a physiographic point of view. The entire country is covered and the treatment is detailed enough to give a good picture of the land forms prevalent in its every region. All the important original sources have been drawn upon and descriptions compiled from a careful analysis of their contents. These analyses are excellent, as may be seen from the following example:

"The Aquarius, the grandest of all the High Plateaus, is about 35 miles long, of variable width, and 11,600 feet high. Its summit is clad with dense spruce forests sprinkled with grassy parks and exceptionally beautiful lakes. These are not small pools but broad sheets of water from 1 to 2 miles long. Their existence is due to differential erosion by local glaciers that originated in the higher portions of the plateau. Eight thousand five hundred to 9,000 feet was the lower elevation of the glaciers of the region and it is at this level that the terminal moraines are usually found. The high elevation of the Aquarius Plateau, 10,500 to 11,600 feet, favored the exceptional development of glacial forms in the Pleistocene, just as to-day it favors a greater rainfall and better forest cover than occur on the neighboring lower plateaus.

"The upper surface of the Aquarius is developed upon a 1,000 to 2,000 foot layer of basalt, which gives rise to marginal cliffs of exceptional height and steepness, as on the northwestern flank. Again, on the eastern border, a great wall from 5,500 to 6,000 feet high overlooks the lower country and owes its boldness largely to the hard lava cap at the summit." (p. 263. There are two references to Dutton's High Plateaus.)

Of course this represents a great amount of labor, but it has had its fruition in the only complete account of the surface of the whole country that exists in any such detail.

The author has attempted to steer a middle course between "purely descriptive writing and * * * altogether explanatory writing." The reader is evidently supposed to have had a good course in physiography—the explanatory science of land forms,—for in the first ten pages of the physiographic part occur such technical terms as tectonic, dissected fault scarp, antecedent, peneplain, horst, tilted block structure and glacial cirques. Bowman's work makes no pretence to be an exposition of the science; it merely uses physiography for description.

The title of the book is misleading, therefore: it has the merit of being brief and distinctive. No other book has this name, and it has something to do with forests in that it is designed for the author's "forestry" students at Yale. It was obviously this aspect of the work that led to the inclusion of the hundred pages on the nature and origin of soils, as this is lacking in the text books of physiography, and students of forestry need it. If a title should tell what is in a book, this one would read "A physiographic description of the United States, with an introductory chapter on soils." "Forest Physiography" is certainly much handier.

The work appeals to all geographers and geologists, and all of them who have made contributions to our knowledge of American physiography will find their work utilized here and properly credited. It appears to be a special feature of the index that it includes the names of all authors cited for however slight a work. It thus serves as an analytical bibliography of the subject-matter. Such a work is not supposed to be read continuously but rather by parts, on reference. Nevertheless, the book is eminently readable.

Necessarily, some features described are still of disputed origin, but Bowman puts the emphasis on the nature of the features. His references make it easy for a reader who wants the opposing views to find them. For the nature of the Great Lakes country, for instance, there is no account for the general reader at all comparable to this.

The publishers will doubtless correct a number of misprints, in another printing, and refer more clearly to the Plates. The author is to be congratulated on having produced that not too common thing, a good and useful book.

MARK JEFFERSON.

Natural Vegetation as an Indicator of Possibilities of Land for Crop Production in the Great Plains Area. By H. L. Schantz. *Bulletin* 201, Bureau of Plant Industry, Washington, 1911.

Dr. Shantz's Monograph is designed primarily to aid settlers on the High Plains in judging the agricultural values of soils by the native vegetation. In this region of light rainfall practically all other soil factors are subordinate to moisture conservation, and the native plants that show a soil receptive to and retentive of moisture are indicative of the best types of agricultural lands.

Three plant groups or "associations" are described, the short grass, the wire grass and the bunch grass. The short grass with a shallow root system indicates a compact loam or "hard land" into which rain cannot penetrate deeply. Although a fertile type in humid regions, this soil is not favorable for ordinary crops in years of average rainfall.

The wire grass indicates a sandy or sandy loam soil which readily allows the penetration of rain and by its fine surface mulch conserves the soil moisture. Such a soil is too heavy to blow readily and yet is porous enough to contain an adequate moisture content.

The bunch grass is characteristic of the sand hills. It is also found on loamy ridges, on clay areas and along streams where the active soil creep breaks up the soil and makes it pervious to rain. This type also indicates soil that has a favorable moisture content.

Considerable loss has resulted to Eastern settlers who chose the "tight" loam, a soil that in humid regions would be fertile, and these lands have had selling value not justified by their crop possibilities. Those familiar with the soils have located on the more sandy soils, an interesting example of geographic response. Much interesting data of rainfall, run off, available and unavailable, soil moisture and botanical studies are given. F. V. EMERSON.

The Ice Age in North America, and its Bearings upon the Antiquity of Man. By G. Frederick Wright, D.D., LL.D. xxi and 763 pp. Maps, illustrations, bibliography and index. Bibliotheca Sacra Co., Oberlin, O., 1911. 9 x 6.

Wright's Ice Age has been for years the popular source of information as to the work of the ice and its extent in North America. The readable style and the first-hand knowledge and observation of the author make attractive reading for those who wish a general idea of the subject.

The fifth edition differs from its predecessors in a somewhat more ample presentation of the data gathered during the last ten years especially in the Mississippi Valley. The chapters on the causes of the glacial period are most interesting, affording as they do a summary of the principal theories which have been advanced. The author does not fully accept Chamberlain's hypothesis as to the rôle of carbon dioxide in the formation of continental glaciers but rather inclines to Croll's theory.

The sub-title of the book is treated in the last four chapters. The author's discussion shows his strong bias toward the idea that man's existence during the glacial period is shown by the discovery of implements of human manufacture in the drift. The discussion of this disputed question is interesting, although hardly convincing.

To working geologists, the inclusive bibliography is useful; it includes the titles of hundreds of papers that bear on the facts and problems of glaciers and glaciation. Over 200 maps and illustrations add to the value of the book.

F. V. EMERSON.

Labrador: Its Discovery, Exploration, and Development. By W. G. Gosling. xii and 574 pp. Maps, illustrations and index. The Musson Book Company, Ltd., Toronto. 9 x 6.

If this be by way of preface to Dr. Grenfell's book on Labrador, we shall await with interest the wine which has so goodly a bush. To this coming work Mr. Gosling relinquishes everything that might pertain to the biologic study of this region. For himself he has selected two principal themes, the moot points of the discovery history of Labrador and the more recent entrance of the bleak shore upon the page of history. While sedulous to attribute a credit richly deserved to Henri Harrisse for the gathering of all the shreds of documentary evidence which might be gleaned for the study of the discovery, Mr. Gosling has a credit of his own for making this material more readily accessible and for clearing up several points which have hitherto been most obscure. In connection with this branch of his theme, he has provided excellent reproductions of all known charts which bear upon the beginnings of history on this coast, and in the text has been careful to provide painstaking explanation, for it must be acknowledged that few but highly trained geographers can read to comprehension the maps of the old voyages. The mass of transcriptions of old records and less obvious material for the geographical study is a startling reminder of the magnitude of the long dispute over priority in this discovery. We incline to accept Mr. Gosling's conclusions as to the matter at issue, he presents most excellent argument in support of the Norsemen, and the Eskimo traditions as interpreted by him are convincing. So far as relates to the Cabots and Corte Real there is little left to debate. The matter has been satisfactorily cleared up with the comparative wealth of material now placed in our hands, and it is clear that the former uncertainty has been most largely due to the fact that each new discoverer in turn looked upon this forbidding coast as a worthless possession, an opinion tersely recorded on Ribero's map of 1529: "Labrador was discovered by the English; there is nothing in it of any value."

The author deserves commendation for the temperate statement of matters which have undoubtedly too long remained *sub júdice.* There has been disorder in the setting forth of claims and in the resistance to demands considered unjust. The disputes have at times reached the pitch of hot-headed violence, unavoidable under the circumstances. Mr. Gosling supports the cause of the Canadians and that is undoubtedly right from his side of the line, and on this side the time has gone by when any great degree of animosity can be stirred up over a question which is properly a matter for arbitration. A far graver indictment against us is found in the record of the disease and death which followed the shameless cruelty of the recruiting in Labrador of a party of Eskimo for one of our fairs. WILLIAM CHURCHILL.

Through Trackless Labrador. By H. Hesketh Prichard. xv and 244 pp. Map and illustrations. Sturgis & Walton Company, New York, 1911. $4. 10 x 8.

This is the record of the exploration which leads nowhere yet which is by chance productive of such good results. Actuated by curiosity to see what may lie at the back of beyond, feeling the challenge of the few areas yet remaining to our maps with the legend "unexplored," scores of the young and hardy are pushing out and making each his little strip of unknown known. Sometimes the result is a narrative, and this one appears in a handsome volume, from which the student may glean at first hand notes of value. There is at least individuality about such record, sometimes a random word or careless phrase reveals a truth which has evaded the attention of more serious observers. Sometimes, again, puzzlement results. Time and again the reviewer has turned back to the cryptic statement on page 158 at the end of a short paragraph which sums the information as to games among the Eskimo: 'Their only game nowadays is rounders, which was taught them by a missionary, whose name, not inappropriately, was Fry."

One of the most valuable notes in the whole work is pure accident, a picture of a Christmas tree in the mission house at Nain. Every candle flame is ringed with an aureole of some four inches diameter. It has its bearing on the troubled subject of ventilation. It shows that in this tightly closed room, where the winter below zero must be kept out, the air is chilled to a point where its vapor saturation must exist in the form of invisible frost spicules; only in the heat of the candle flames is the frost melted and the light reflected on the frozen shell has found a record on the sensitized plate. The narrative is interesting throughout; its value will depend on the use which may be made of its really valuable notes. As each student must collate those for himself, the inconvenience of the absence of an index is lessened.

WILLIAM CHURCHILL.

Saddle and Camp in the Rockies. An Expert's Picture of Game Conditions in the Heart of our Hunting Country. By Dillon Wallace. xvi and 302 pp. Illustrations. Outing Publishing Co., New York, 1911. $1.75. 8½ x 6.

The results of a journey with saddle and pack animals, begun in Arizona and pursued northward into Montana, nearly 2,000 miles, the principal purpose being to study at first hand the big game conditions.

Through Southern Mexico. Being an Account of the Travels of a Naturalist. By Hans Gadow. xvi and 527 pp. Map, illustrations and index. Witherby & Co., London, 1908. 18s. 9 x 6½.

When travels of a Naturalist are properly handled in writing, they can never fail to be of special interest to Geography. In the present instance we can only commend the leading part assigned by the author to his special branch of research. Zoology justly appears as the preponderating theme and subject and it is entertainingly interwoven with descriptions of the countries and not too much loaded with personal experiences not germane to the subject. Mr. Gadow has also illustrated the volume in a manner making it a reasonable picture-book, not a would-be scientific "struwelpeter," as is too often the case, with the present tendency of making of the text a sort of foot-notes to pictures.

He naturally begins with the valley of Mexico, and on that occasion devotes considerable (not too much) space to the interesting Siren or "Axolotl" of the waters of Lake Tezcoco. Here we must observe, that one of the few failings of the author is to meddle with things of which he knows nothing, among which the aboriginal languages of Mexico are specially prominent. His etymology of the word "Axolotl" is an evidence of it. He ignores the fact that that word is composed of "Atl" (which fact he recognizes) and "Xolotl," which means dwarf, so that "water dwarf" is the true meaning of the name, just as "old dwarf" that of the turkey. Again his criticism of the building of the city of Mexico on the site of the ancient Mexican settlement as "insanity" only shows ignorance of conditions of the Spaniards in the early decades of the sixteenth century.

In Chapter II, a very good dissertation on the Agave, its numerous varieties and on the far-famed beverage "Pulque," is inserted; then we are led up the volcano of Orizaba by means of a description by somebody else who made the ascent. Zoological and botanical references of merit and popular value enliven the very readable text. As a naturalist Mr. Gadow is never tiresome. Then, from Cordova, he turns to the South.

Chapters (IV and V) devoted to a picture of tropical forests and forest-life are excellent. Although his visit to such sections was made in a Pullman car, they are full of information, and enjoy a vivid picturesqueness showing that he felt understandingly, saw correctly. Not to fall into constant repetitions, we will state, once for all, that these valuable traits go through the whole book, whenever nature comes into play. He admires sincerely but intelligently and never tumbles into the pitfalls of sentimental rapture. The same may be said of his allusions to people. Not much of what is now termed "ethnological" is found in the detail, but there is the true "Ethnology," by one who has looked well, and with a large degree of impartiality. Of all the nationalities he alludes to, Americans come off worst. They seem to be looked at as illegitimate competitors in a country that escaped British sway.

Thus the author carries us rapidly, but agreeably, not on a connected trail, as far as the State of Colima in western Mexico. The book ends with a narrative of an ascent of Popocatepetl and a chapter dedicated to the Colima, Mexican volcanoes in general, and some most interesting zoological notes. Whenever Mr. Gadow treats of animals or plants he is at his best, one feels he is perfectly at home.

This cannot be said in regard to his incursions in the field of aboriginal history and linguistics. His acquaintance with these subjects can be qualified as a—vacuum encompassed by atmosphere. No vacuum being perfect, very few molecules appearing as knowledge may be faintly discerned. This is regrettable, as all the rest is good, and entertaining, so that the unsophisticated reader remains under the impression that all is alike trustworthy. Chapter XV has, as its bouquet, one of those dismal arithmetic arrays of jugglery applied to so-called Indian Chronology. It might very well have been omitted, there was no need to increase the already deplorable list by one more.

AD. F. BANDELIER.

SOUTH AMERICA

Lands of the Southern Cross. A Visit to South America. By the Rev. Charles Warren Currier, Ph.D. 401 pp. Map, illustrations and bibliography. Spanish-American Publication Society, Washington, D. C., 1911. $1.50. 8 x 5½.

This book was written by a delegate of the United States to the International Congress of Americanists at Buenos Aires, and it is an account of his journey to Buenos Aires from New York via Bahia, Rio de Janeiro, Santos and Montevideo and his return via Santiago, Valparaiso and the west coast. It covers the same ground as a number of other books on South America. The author is a priest of the Catholic University of America and his office brought him into contact with ecclesiastics and gave him a better opportunity than other authors have had to obtain an insight into the religious life of the country. This is the personal equation and in this alone can the book be considered a new contribution. In every city a call was made at the cathedral and a careful and well-balanced statement is made concerning the religious status.

R. M. BROWN.

AFRICA

British and German East Africa. Their Economic and Commercial Relations. By Dr. H. Brode. xiv and 175 pp. Illustrations and map. Longmans, Green & Co., New York, 1911. $2.10. 6 x 9.

A timely book by an authoritative writer dealing with the economic development and commerce of British and German East Africa and the interrelations of these Protectorates. They have profited greatly by each other's experiences. The Germans found that there was great economic value in beeswax. The quantity exported in one year was worth $365,000. Observing the success of this trade, the farmers in British East Africa took it up and their exports in 1907 were worth $450,000. The results of the Uganda railroad stimulated the Reichstag to grant means for the prolongation of the Usambara and the construction of the Central railroads in German East Africa. The gradual development of these contiguous German and British possessions is continually bringing them into close economic relations. Fourteen per cent. of the total trade of German East Africa in 1909 was through British East Africa and Uganda via the Uganda R.R.

Most of the new industries introduced into these Protectorates met with great discouragement at first. The cultivation of cotton began to suffer from various pests soon after it was introduced, but the industry is now well-established, and this is partly due to the constant exchange of experiences and correspondence between the Kolonialwirtschaftlichen Komite and the Cotton Growing Association. When sisal cultivation in German East Africa began in 1893 only 6 per cent. of the 1,000 plants imported from America survived; but about 20,000,000 plants are now thriving on the plantations of German East Africa; and British East Africa is going into the industry. The German Protectorate in 1908 had 570,000 cocoanut trees of bearing age on their European plantations. The British plantations across the border were started later and several years must yet elapse before they will yield returns.

Among the interesting discoveries have been the German gold mines of Sekenke, now yielding considerable profit; the large tannin content of mangrove and black wattle, now a new source of wealth in both Protectorates; and two soda lakes, one on the English and the other on the German side of the line, which will yield bi-carbonate of soda in abundance. These are only a few facts from the large amount of data, interestingly presented, which appear throughout this valuable book.

Fachoda. Le Partage de l'Afrique. Par Gabriel Hanotaux. xii and 357 pp. 2 maps. Ernest Flammarion, Paris, 1909. Fr. 3.50.

The book is not only a history of the Fashoda incident, but also a review—from the French point of view, of course—of the events and circumstances which led to that critical episode in French colonial history. As an actor and witness of that drama, Mr. Hanotaux, the former Minister of Foreign Affairs, is certainly a most authoritative writer on the subject, and what gives his statements even more weight is the complete collection of the authentic documents relative to those events which he reprints in the appendix to corroborate his story.

Yet the book is more than a political treatise. Starting from the thesis that, while the rivalry of the French and English in Africa was certainly the direct cause of the Fashoda clash, one would nevertheless fail to understand its true character unless it be assigned its place in the history of the dividing up of Africa. The author gives, in the first part, an excellent *résumé* of the great discoveries of the Nineteenth Century and the political claims which were based on them by the different nations; he explains the geographical reasons why the range of exploration was so long limited to the coasts, and then shows how the different political claims finally narrowed down to those of France and Great Britain. He shows how the upper Nile country was predetermined to become the bone of contest, and proves, on documentary evidence, that France had been at all times doing her best to secure an amicable agreement and would have secured it about Fashoda as well if the imperialistic party in England had not preferred the conflict. For Great Britain had long been informed that France wanted an access to the Nile for her Central African empire, and had, as late as June, 1898, concluded the treaty acknowledging the French claims east of Lake Chad without saying a word about the Nile. The expedition of Gen.

Marchand had not a military but a scientific character, for it was to study that access to the Nile and to ascertain a basis on which to agree on the claims of the two powers in the Bahr-el-Ghazal country. It was no wonder, therefore, that it fell an easy prey to Lord Kitchener; and the people failing to support their government, France was obliged to accept the boundary as drawn by Great Britain.

In concluding, the author gives an outlook on the future of Africa in which he reviews the possibilities of the continent. He shows, on the force of geographical and economic arguments, that the obstacles which once prevented the opening up of Africa were obstacles only as long as the policy of small means was prevailing. The hidden treasures of the Dark Continent, he says, will be exploited as soon as adequate apparatus is employed, and modern man will not hesitate to use large means in order to reap large profits. In the course of this process, Africa will finally belong to those who know how to cultivate her best. M. K. Genthe.

England in the Sudan. By Yacoub Pasha Artin. Translated from the French of the Author by George Robb. xvi and 251 pp. Map, illustrations and bibliography. Macmillan & Co., Ltd., London, 1911. $3.25. 9 x 5½.

This is an account of a journey along the two great branches of the Nile. The book is divided into five parts based upon the different stages of the trip: First, an eleven days visit in Khartum, a trip from Khartum up the Blue Nile as far as Rosaires and back, another stay in Khartum, a trip up the White Nile as far as Gondokoro near the Uganda Protectorate and back to Khartum, and finally some general notes on the Anglo-Egyptian Sudan and its inhabitants. The first four parts of the book are in the form of letters written to the author's wife. He gives accounts of many events in the Sudan, so that a wide range of subjects is treated. In many cases he repeats the stories of interested parties, eye-witnesses or otherwise, and thereby gains somewhat in local color. The large problems of the Anglo-Egyptian Sudan such as slave raiding, the ownership of building-lands, the character of government officials, the transportation problem, the place of the native races in the governmental scheme, etc., are brought to the reader's attention. The last section of the book departs from the epistolary style and supplies a logical account of the Anglo-Egyptian Sudan and the Sudanese. Many excellent pictures are included and a map of Sudan.

R. M. Brown.

ASIA

Amurath to Amurath. By Gertrude Lowthian Bell. xvii and 370 pp. Map and illustrations. E. P. Dutton & Company, New York, 1911. $5. 9 x 6.

Under this cryptic title, which is nowhere explained in the book, Miss Bell describes a journey made in the spring of 1909 from Aleppo down the Euphrates to Kerbela and Bagdad, then back up the Tigris to Kharput, and thence westward to Cæsarea and the German railroad in central Asia Minor. By reference to the new Britannica one learns that Amurath is another form of the Turkish name, Murad, and Murad is the name of one of the chief tributaries of the Euphrates. The title means "From Euphrates to Euphrates" and is well chosen, for the book is primarily an account of the little-known left bank of that river from Carchemish almost to Hit. To those who were delighted with Miss Bell's volume on Syria, "The Desert and the Sown," the present volume will be something of a disappointment. There is the same vivid description, the same inimitable reproduction of most enlightening conversations with the natives; but there is far too little of these things. The bulk of the book consists of detailed descriptions of ruins and of the relation of one type of architecture to another, interesting to the archæological specialist, but apt to be skipped even by a conscientious reviewer. A good deal of the rest of the book is devoted either to the ordinary traveler's tales, well told but elucidating no new principles, or else to comments on the fact that Kiepert's last map is in error.

Nevertheless, the book is interesting, and gives the reader a new point of view in three important respects. In the first place, the poverty and desolation of the greater part of Mesopotamia is sad to think upon. Little patches of cultivation close to the great river and often in danger from its floods, and a vast desert peopled by starving Arabs extending indefinitely on either side—that is all there is. In the second place, this desert is full of ruins. All the world knows this fact, but it will be a surprise to most readers to find not only that ruined villages are scattered in such extraordinary abundance that one comes upon them every two or three miles in many places, but also that so large a proportion date from the relatively recent period of the Moslem empire of the Caliphs in the middle ages. The third and perhaps most important point brought out by Miss Bell is the contrast between the immovable inertia of the people of Mesopotamia and the relative mental activity of the Syrian coast and still more of European Turkey. In no part of the Turkish Empire are the people alert in the manner of the inhabitants of Western Europe and America, but the difference between Mesopotamia and the Balkans seems to be almost as great as between the Balkans and Germany. This cannot be wholly a matter of race, but Miss Bell does not attempt to explain it. She is content to set forth the fact most convincingly by quotations from conversations on the political situation. In central Asia Minor the peasants have almost no idea of what the new régime means, but in Mesopotamia they scarcely seem to know that there is such a thing. How little the people think and how well Miss Bell hits off their salient characteristics is apparent from the following quotation:

"On the Syrian side the Euphrates is hemmed in here by hills whereon stands the castle of Salihiyeh. In this wilderness we came upon some Arabs who were ploughing up a desolate spot in search of locusts' eggs.

"Are there many locusts here?" said I, for locusts are not accustomed to lay their eggs in the sand.

"No," they answered, "there are none here; but, as God is exalted, there are thousands lower down."

"Then why do you plough here?" I asked with the tiresome persistence of the European.

"The government ordered it," said they, and resumed their task."

ELLSWORTH HUNTINGTON.

Among the Tribes in Southwest China. By Samuel R. Clarke. xv and 315 pp. Map, illustrations, and appendices. Morgan & Scott, Ltd., London, 1911. 8 x 5½.

China at its edges must write the best commentary that can be established upon China at its very heart. It is at the marches that we are to look for the true spirit of Chinese culture as a civilizing force, if any such it has. In these pages we have the record of daily observation for a long life of activity of one capable of observing what China has been able to do in centuries of intercourse with alien races and earlier inhabitants of a soil upon which Chinese expansion long ago established itself. With a recognition, as valuable as it is rare, that the record of missionary endeavor complicates the reading of the story of distant and little-known folk, the author has split his book fairly in the middle, half is ethnographic record, half is devoted to the story of the propagation of the faith. This honesty of purpose will attract the reader, the missionary pages will be found as interesting and very nearly as instructive as the former section of the book. The tribes with whose history and welfare Mr. Clarke has so long been engaged are the Miao of the province of Kweichow, which lies between Hunan and Yunnan, south of Szechwan and north of Kwang-si. Linguistically they are provisionally associable with the tonal languages which appear seated at the head-waters of the great streams which in their lower courses have become the homes of the rich cultures of Burma, Siam and Cambodia. Without strength to hold their own against the Chinese advance, too powerless to fight their way to new homes, the Miao have remained in a condition of practical slavery, a clear proof of the immiscibility of Chinese culture even with races not far from the same ethnic and culture horizon. In two chapters the author deals briefly with the Chung-chia, for whom he finds identification with the stock of the Shans of northern Burma, and the Lo-lo or No-su for which a Tibetan origin is sought. WILLIAM CHURCHILL.

The Changing Chinese. The Conflict of Oriental and Western Cultures in China. By Edward Alsworth Ross. xvi and 356 pp. Illustrations and index. The Century Co., New York, 1911. $2.40. 8½ x 6.

China is changeless, China is changing every hour of these its crowded days. These are all a matter of choice. To those who have essayed to create a gross psychology, the psychology of empires, China has long stood as the stock evidence of a land whose arteries have hardened and which has passed into a sort of senile communal decay, uninterested save from hand to hand in daily routine and unaroused as to a future which neither dismays nor attracts. To those who seek to follow the course of that which purports to be news, there seems a new and vivid China, a land of revolution, of a resurrection from Manchu death, a land of republican ardor. Before we can comprehend this China which changes not and this China which is fairly spinning, who can comprehend our old friend Wu Ting-fang? Is this leader of republican activity in a land which tried out and discarded the republic 2,000 years ago, is he the mystic Oriental and real? Is he wholly artificial, the creation of the American newspaper man? Frankly, I believe the latter; not only have I had a part in the creation, but I have had this belief confirmed by a Chinaman so high in the councils of his land that the Wu Ting-fangs were but the pawns with which he played the great game. Is China changing? Who knows? The chapters of this volume are little more than a year old in their former magazine source, yet Prof. Ross caught no glimpse of such an impending change as we are led to believe, yet on no authority that we can wholly trust, is now taking place in the Middle Kingdom. But change or no change, we have here an interesting story of competent observation. It is exterior observation of necessity, it is a series of judgments of the superficial Chinaman on a China surface beneath whose glaze it is so difficult to penetrate. But not of the same necessity is it superficial judgment; far from that, the author approaches his task with a recognition that the simpler the standard of measurement the more accurate the record. Of all this manner of investigation one character is fundamental, the Chinese are judged by their capacity for the absorption of Occidental custom, quite forgetting that much of the basic principle of all this new Occidentalism is matter which China has already experimented with and has discarded as not adapted or adaptable to its national life. Our author's own science of sociology is by no means cordial to all of Occidental development in its own home, and he should be the last to expect it to be adopted in its known imperfection by a race who were thinkers when Noah was but a weather prophet. Yet we welcome this book, welcome it in a season when books on China come in crowds, for it has a saving grace in its willingness to set before the reader the fact that in China are men like-minded with ourselves.

William Churchill.

From Western China to the Golden Gate. The Experiences of an American University Graduate in the Orient. By Robert Sprague. 128 pp. 30 illustrations. Lederer, Street & Zeus Co., Berkeley, 1911. 7 x 5.

This book contains a brief description of a trip from Chentu, in the Tibetan borderland of China Proper, to San Francisco. It is a traveler's story of the scenes and incidents of the journey which was made by sedan chair, by rafts and by various types of boats through interesting sections of the Empire. The book gives but a fleeting glance of the country except in two chapters, one of them reporting a visit to the sacred mountain of China, Omei, and the Great Buddha, and the other detailing the appointments and the arrangements of a Chinese inn. As an appendix is a long chapter on the recent and radical changes (the book antedates the inception of the rebellion), which deals largely with the betterment of the river transportation into the interior and the partial elimination of beggary in western China. The work contains a number of excellent pictures on a variety of themes, while the text is, to a great degree, simple in its character, so that for certain aspects of Chinese life it may be used as a geographical reader. Robert M. Brown.

India and the Durbar. A Reprint of the Indian Articles in the "Empire Day" Edition of The Times, May 24th, 1911. Index, viii and 356 pp. Macmillan & Co., Ltd., London, 1911. $2. 8½ x 5½.

Even the wise prevision which induced a great newspaper to provide in a topical and timely special edition the valuable articles which now appear in this volume could not have looked for the dramatic turn which the recent durbar has taken, the restoration of Delhi to its former glory, but now as the capital greater than India has ever known. For the first time since Disraeli added the imperial surcharge upon the style of British kings an English monarch has gone into the oldest of the remaining possessions of the British Empire which are truly imperial. There was display at the durbar, the pomp of Asia is yet potent in many ways; how far the glitter of jewels, the tread of marching elephants, the homage of tributary princes, even the superposition of a crown whose history is written but in last year's journals of the goldsmiths, how far all this will avail to check the great Indian unrest—all this is foreign to the purpose of a literary review to discuss. But the conditions which remain when the howdahs and gay caparisons are taken from the elephants, when the princes go back to squeeze their tribute from complaining masses, these are the theme of the several essays by distinguished hands which make up this volume. The best feet are foremost, that of course. The most encouraging views are here set forth, for Empire is now a fetich in the great little island which bears such a load of the burden of Atlas. Cheerful, hopeful, interesting, these pages are a record of what should be, a commentary on what India is.

WILLIAM CHURCHILL.

EUROPE

British Rainfall, 1910. By Hugh Robert Mill, Director of the British Rainfall Organization. The fiftieth annual volume, 1910. 328 pp. Maps and illustrations. Edward Stanford, London.

We heartily congratulate Dr. Mill on the appearance of the fiftieth volume of the annual report of the British Rainfall Organization. This unique body of observers, organized originally by the late Mr. George J. Symons, and then numbering but a few hundreds, now numbers nearly 5,000. Five of the observers whose records appear in the fiftieth volume also contributed to the first volume. In the present issue the Director makes his first Report to the Trustees, who, as already noted in the *Bulletin,* have now general charge of the property and work of the Organization, Dr. Mill being the Director and being actively responsible for all the details and all the results. Another change is the rearrangement of the stations by river basins, the counties being retained as the units. A special illustrated article explains the new arrangement. The cartographic treatment of the rainfall records has also been carried farther than in previous volumes. We note, also, a very practical article on "The Rain Gauge in Theory and Practice," in which the following points are taken up, *e. g.,* the ideal rain gauge and why it is unrealizable, requirements of a real rain gauge, the placing of the gauge, the precision of rainfall observations. In the account of "Heavy Falls on Rainfall Days" there are some noteworthy photographs of hail which fell on June 9, 1910. One of these shows hail on a lawn an hour after the fall. Another shows hail in a village street three hours after the fall. A third gives a view of a mass of compacted hailstones in a ditch after four days. A fourth represents this same mass lifted out of the ditch and set upright on a foot-bridge. We note, with special satisfaction, Dr. Mill's continued attention to the amount of rain which falls in individual cyclones, which he charts by "cyclonic units" with the track of the depression in each case shown on the maps.

R. DEC. WARD.

Sketches of English Life and Character. By Mary E. Mitford. 320 pp. 16 reproductions in colors from the paintings of Stanhope Forbes, A.R.A. A. C. McClurg & Co., Chicago, 1910. $1.75 net.

A companion volume to "Tales of Irish Life and Character," and equally well illustrated. In her text, Miss Mitford has well succeeded in presenting the atmosphere of "Old England."

D.

Tales of Irish Life and Character. By Mrs. S. C. Hall. 323 pp. 16 illustrations reproduced from the paintings of Erskine Nicol, R.S.A. A. C. McClurg & Co., Chicago, 1910. $1.75 net.

The eleven sketches are highly entertaining and the reproductions in colors from the pictures by Erskine Nicol add greatly to the value of the text. It is seldom that a book is so beautifully and so adequately illustrated. The pictures are well drawn, well composed, and the reproductions are exceptionally good in color, being free from the usual crudities of color work of this kind.

D.

Beautiful Britain. The Channel Islands. By Joseph E. Morris. 64 pp. 12 illustrations and index. Adam & Charles Black, London, 1911. 75c. 9 x 6½.

The Jersey, Guernsey, Alderney, Sark and lesser islands that compose the Channel Islands are here described in their picturesque aspects with many historical allusions and remarks on early buildings and other antiquities. The plates, though highly colored, are pleasing. In a few words on the famous cattle of Jersey and Guernsey the author speaks of the Jersey cow as "rather big" while Guernsey "has a smaller breed of cattle," a statement that may surprise American owners of these breeds.

GENERAL

Accidents of an Antiquary's Life. By D. G. Hogarth. x and 176 pp. 40 illustrations. Macmillan & Co., Ltd., London, 1910. $2.50. 9 x 6.

The title does not well convey the gist of the contents until the volume has been read, then it seems very appropriate. The chapters deal with the diversions, the journeys and the complications associated with the work of the author rather than with his calling. The book opens with a modest account of Hogarth's introduction to archæology. Then follows a complete departure from the chosen path of the antiquary while following the author's experiences as a reporter for an English newspaper during the trouble in the Balkans. All this is told in an interesting and fascinating way. With it all there is given a glimpse of Crete, which was the scene of his journalistic career. Next, and now once more as an antiquary, the story of Lycia and its inhabitants is considered. Then back he goes to Crete. Included in this chapter is a forceful account of extensive erosion during a gale which swept the island. The spectacle is vividly described, and while it was perhaps unusual because of its suddenness, it gives a good illustration of changes which are more generally recorded over a series of years. The story is a capital account of excessive erosion, and one cannot be surprised that the beholders "cowered watching how primeval earth was carved." The next chapter describes the Nile fens. The delta area has rarely been brought to attention so strongly as by this short chapter, though it deals with very limited phases of it. This chapter and the account of the storm mentioned above will be, to those who seek vivid impressions of lands and natural forces, the most interesting portions of the book. Following is an account of a cruise in Levant waters, the Satalian Gulf and Cyrene. The author then gives to the layman a taste of his work as a "digger." He takes for his example the work on the great Artemision at Ephesus. The author seems to have chosen his most revolting example to depict and he does it with a keen knowledge of the possibilities of our language to convey such impressions that the reader is likely to agree with the closing words of the chapter: "Not too nice a trade, you see. Best let it be!" The book is written in a charming style and contains a number of illustrations of a variety of objects.

R. M. Brown.

My Climbing Adventures in Four Continents. By Samuel Turner. x and 283 pp. Illustrations, appendix and index. Charles Scribner's Sons, New York, 1911. 9 x 6.

A fascinating account of climbing on many noted mountains, Mount Blanc and the Matterhorn in Europe, the Altai in Asia, Mount Cook in New Zealand, and Aconcagua in South America. In addition, and fully as interesting, are the records of rock climbs in England, where feats of great difficulty, but without the complications of snow, ice and intense cold, were successfully accomplished. The author began his work in the Alps but soon turned his attention to other mountain peaks. The trial of Belukha of the Altai group during the winter season reads like an extremely hazardous if not foolhardy attempt and somewhat belies the author's insistence on carefulness with which the volume closes. In addition to the extreme cold, this peak was attempted without a base of supplies, the assistants refusing to advance, and, alone, the writer doggedly pushed on until, stiff with cold, sick, with eyes practically closed by inflammation, a mis-step nearly swept him down the mountain side in an avalanche, and the mountain was left, unconquered.

Quite a different story is the chapter on the first and only traverse of Mount Cook. The beginning of the climb was made under favorable circumstances—all the aggravating and strength-consuming preparation experienced in Siberia was wanting—and with three companions, this famous mountaineer successfully went over the summit of Cook. The climb was, of course, extremely dangerous, and the descent on the icy slope was painful, but in this instance Turner exhibited the most painstaking care without which the slope could not have been conquered.

The writer speaks modestly of his work as an author, being, as he says, "a commercial man, not a literary man"; but he may well be proud of his work as a climber, and "this plain, uncolored narrative" has for the person interested in mountains much that is worth reading. R. M. BROWN.

Le Ciel et l'Atmosphère. Par Louis Houllevigue. xii and 304 pp. Armand Colin, Paris, 1911. F. 3.50. 7½ x 5.

The present writer is glad that the boundaries of our science are hazy if it brings books like this to his table. He must confess, however, that it concerns itself rather with cosmogony and physics than geography. But since 1885, when Miss Clerke's History of Astronomy in the Nineteenth Century appeared, there has come to his hands no such charming account of recent scientific progress.

The chapters on the Synthesis of Light and Wireless Telegraphy are admirable. "The work accomplished belongs to three of the brightest geniuses humanity has possessed, Faraday, Maxwell and Hertz. To-day we can see it in its completeness with its twofold scientific and practical crowning: the synthesis of light and wireless telegraphy" (p. 131). This synthesis of light is not quite what we of an older generation would suppose. Octaves have been borrowed for us from acoustics to think of light waves. The higher ray has half the wave length of the lower. Starting with a ten thousandth of a millimeter, two such octaves cover the tiny wave-lengths of the ultra-violet rays, a third all visible light, then six the invisible rays of heat when we encounter a gap of six octaves more. Below this gap we find the electric waves of Lampa and of Hertz from the sixteenth to the nineteenth octaves, the carriers of the "wireless." A giant Ruhmkorff coil can generate waves of six meters length; Lampa's tiny coil, of the size of a sewing machine bobbin, waves of four millimeters. We are prepared to find the agitation of the ultra-microscopic electrons generating the almost infinitely short waves of light.

They are grave matters that the author handles lightly. Eighteen brief lines picture Rutherford's magnetic detector (p. 185). Another twenty-five include both history and account of the Lodge coherer. No diagrams are used. He is a literary man, showing principles, not mechanisms. The grace of treatment reminds a reader of Miss Clerke, though he misses her fuller bits of biography.

Ultra-violet rays (p. 119) produce ozone from air. "Chemists regard the molecule of oxygen as formed by the marriage of two atoms of oxygen. This union, for the most part peaceful enough, is troubled by the addition of a third atom of oxygen; these three atoms of oxygen, in forced companionship, constitute ozone. Ozone is exasperated Oxygen." Svante Arrhenius is told in this connection that a space filled with ultra-violet light would be deadly to any spores that attempted the voyage between planets. We have long recognized in our atmosphere a shield from the incessant bombarding of meteoric grains. Here we learn of it as no less a shelter from the fatal ultra-violet rays.

A chapter of most timely interest is on the flight of birds. The most geographic chapters, principles of meteorology and forecasting the weather, have less of special interest. Guilbert's method of forecasting the paths of cyclones by studying the surface winds is a good feature, not only for its intrinsic interest but also for the admirable way in which it is described. At this point are inserted the only diagrams in the book. "Men say of meteorology, if it is a science, what is it good for? What does it do?" The author answers. "It gathers data and takes *means!* If it did not rain as predicted at least there were sixty-five chances in a hundred that it would!" The reference to the Gulf Stream is less happy.

Altogether it is a delightful volume of essays of astonishing clearness. If these notes on it lack unity, so does the book. But if its nine chapters are loosely connected, perhaps some of them attain a higher interest than can be long maintained.
MARK JEFFERSON.

The Evolution of Plants. By Dukinfield Henry Scott. 239 pp. Illustrations, bibliography, and index. Henry Holt & Company, New York, 1911. 75 cents. 7 x 5.

This is a book of the Home University Library of Modern Knowledge series and is advertised as "the story of the development of flowering plants, from the earliest geological times, unlocked from technical language." The book is not, however, a popular treatise. It opens with a statement of the Darwinian theory of natural selection as a cause of evolution and, with this as an assumption, proceeds to trace, through the geological history as it is recorded in the fossils, the course which plants in their evolution have followed. A selection of groups of plants is made for treatment, so that the scope of the book is limited to the fossil evidences of the flowering plants, the seed plants and the higher spore plants. By the use of these groups a somewhat logical connection is made with the first known plants of the paleontological series to the highest types of the present. The flowering plants are traced back to the highly organized Mesozoic seed plants, and the seed plants in turn are traced back to the spore plants of the Paleozoic period. No attempt is made to suppress the difficulties in the acceptance of the evidence and the book in its clear presentation of the present status makes a strong plea for further investigation.
ROBERT M. BROWN.

OTHER BOOKS RECEIVED

The Iowa. A reprint from *The Indian Record,* as originally published and edited by Thomas Foster, with introduction, and elucidations through the text. By William Harvey Miner. xxxv and 100 pp. Map, illustrations and index. The Torch Press, Cedar Rapids, Iowa, 1911. $1. 8 x 5½.

Spring Flora of the Wasatch Region. By A. O. Garrett. xii and 106 pp. Index. Skelton Publishing Co., Salt Lake City, 1911. 7½ x 5. [The Flora contains practically all the plants that blossoms in the spring in that region on the eastern edge of the Great Basin].

A Bibliography of Wisconsin's Participation in the War Between the States. Based upon material contained in the Wisconsin Historical Library. Compiled by Isaac Samuel Bradley. ix and 42 pp. Index. Wisconsin History Commission, May, 1911. 9 x 6.

The Pathbreakers from River to Ocean. The Story of the Great West from the Time of Coronado to the Present. By Grace Raymond Hebard. x and 263 pp. 4 maps, illustrations, bibliography and index. The Lakeside Press, Chicago, 1911. 7½ x 5. [A condensed story of the pioneers in the unsettled and unorganized territory of the West.]

Practical Forestry in the Pacific Northwest. Protecting Existing Forests and Growing New Ones, from the Standpoint of the Public and that of the Lumberman, with an Outline of Technical Methods. By E. T. Allen. 130 pp. Western Forestry and Conservation Association, Portland, Ore., 1911. 50c. 9 x 6.

The University of Virginia. Memories of Her Student-Life and Professors. By David M. R. Culbreth. 501 pp. Illustrations and index. The Neale Publishing Company, New York, 1908. $5. 8½ x 6.

The Western Gate. By Patrick H. W. Ross. iv and 153 pp. Maps. Dodd, Mead & Co., New York, 1911. 75c. 7½ x 5.

Lovells's Gazetteer of the Dominion of Canada. Containing the latest descriptions of over 14,850 cities, towns, villages and places; together with Newfoundland, etc. Edited with an introduction by G. Mercer Adam. Fourth Edition. xlix and 970 pp. John Lovell & Son, Ltd., Montreal, 1908. 8½ x 6. [The only work of its kind in Canada and a valuable book though in need of revision to include the results of the last census and notices of many new settlements.]

Les Cinq Républiques de l'Amerique Centrale. Costa Rica—Guatemala—Honduras—Nicaragua—Salvador. Par Le Comte Maurice de Périgny. 259 pp. Map and 26 photographs. Pierre Roger et Cie, Paris, 1911. Fr. 4. 8 x 5½. [A careful account of the industrial, commercial and financial conditions of these republics.]

Mexico. A General Sketch. Compiled by the Pan American Union. John Barrett, Director General. Francisco J. Yánes, Assistant Director. xvii and 389 pp. Maps, illustrations and index. Washington, D. C., 1911. $1. 9½ x 6½.

El Clima del Altiplano y la Extension del Lago Titicaca con relación á Tihuanacu en épocas prehistóicas. By Arthur Posnonsky. Map and illustrations. Tipografia Commercial de Ismael Argote, La Paz, 1911. 8 x 5.

THE TEN REPUBLICS. An introduction to the South American Series in Porter's Progress of Nations. By Robert P. Porter. x and 292 pp. 12 maps and index. George Routledge & Sons, Ltd., London, 1911. 2s. 6d. 7½ x 5. [A concise review of the history and the economic and industrial progress of the South American Republics.]

LE MAROC IL Y A CENT ANS.. (Souvenirs du Chirurgien W. Lemprière.) Annotés d'après les Documents d'Archives et les Mémoires. By Albert Savine. In series: Collection historique illustrée. Illustrations. 190 pp. Louis-Michaud, Paris, 1911. 7½ x 5.

GUIDE DU COMMERCE ET LA COLONISATION A LA CÔTE D'IVOIRE. 260 pp. Maps and illustrations. Office Colonial, Galerie d'Orléans, Paris, 1911. Fr. 5. 10 x 6½. [An authoritative work on this colony.]

THE MONKEYFOLK OF SOUTH AFRICA. By F. W. Fitzsimons. xv and 167 pp. 60 illustrations. Longmans, Green & Co., New York, 1911. 8½ x 6½. [Most of the pictures of monkeys are from photographs of the animals taken in their natural habitats. A book of facts especially intended for young readers.]

HANDBOOK OF THE SOUTHERN NIGERIA SURVEY and Text Book of Topographical Surveying in Tropical Africa. By Major F. G. Guggisberg. xii and 246 pp. Maps, illustrations, and index. W. & A. K. Johnston, Ltd., London, 1911. 3s. 6d. 10 x 6½.

UGANDA TO KHARTOUM. Life and Adventure on the Upper Nile. By Albert B. Lloyd. With a preface by Victor Buxton. 319 pp. 57 illustrations and index. Charles Scribner's Sons, New York, 1911. 8 x 5½. [Third Edition of a delightful and informing book reviewed in the *Bulletin* (Vol. 38, 1906, p. 781).]

LA CHINE MODERNE. Par Edmond Rottach. Collection "Les Pays Modernes." Deuxième edition. 270 pp. Map and 20 photographs. Pierre Roger & Cie, Paris, 1911. Fr. 4. 8 x 5½. [An excellent work on the intellectual and industrial transformation now in progress in China, with a survey of the conditions existing before the present revolutionary movement.]

INDIA. Eight Lectures. Prepared for the Visual Instruction Committee of the Colonial Office. By H. J. Mackinder. x and 146 pp. Maps and illustrations. George Philip & Son, Ltd., London, 1910. 8d.

VICTORIAN YEAR-BOOK, 1909-10. By A. M. Laughton, Government Statist. Thirtieth Issue. xxxvi and 732 pp. and maps. J. Kemp, Government Printer, Melbourne, 8½ x 6. [Gives much information of the State of Victoria, its conditions and activities.]

ALPINE PLANTS OF EUROPE TOGETHER WITH CULTURAL HINTS. By Harold Stuart Thompson, xv and 287 pp. 64 colored plates (311 figures), map and index. George Routledge & Sons, Ltd., London, 1911. 7s. 6d. 8½ x 5½. [Some 700 species of plants of the high Alps are described. The colored illustrations are especially noteworthy.]

VOYAGE EN AUTOMOBILE DANS LA HONGRIE PITTORESQUE. Fatra—Tatra—Matra. Par Pierre Marge. Préface de M. Édouard Herriot. xx and 285 pp. 6 illustrations and index. Plon-Nourrit et Cie, Paris, 1910. Fr. 3.50. 7½ x 4½.

LA VALLÉE D'AOSTE VUE À VOL D'OISEAU, EXÉCUTÈ par Ch. Thomasset d'après le plan relief de M. le Ch. Louis Vesco Ch'ne. Édition et Propriétée reservée à Juste Vittaz, Libraire Aoste, Italie. 8 x 5½. [Sixteen plates giving birds'-eye views in relief, showing areas covered by snow and glaciers, climbing routes, heights of mountains, etc.].

AOSTE ET SES ENVIRONS. 1911. Plan and illustrations. 64 pp. Juste Vittaz, Aoste. 8 x 5.

ABERDEENSHIRE. By Alexander Mackie, M. A. Maps and illustrations. x and 198 pp. University Press, Cambridge, 1911. 7½ x 5.

THE PLACE-NAMES OF BERKSHIRE. By the Rev. Walter W. Skeat. 114 pp. Index. Clarendon Press, Oxford, 1911. 2s. 6½ x 4½.

BRITISH PLACE-NAMES IN THEIR HISTORICAL SETTING. By Edmund McClure. 349 pp. Index. Society for Promoting Christian Knowledge, London, 1910. 5s. 8 x 5½. [Discusses British place names as they occur chronologically in authentic documents from 54 B. C. to A. D. 1154.]

THE BRITISH MUSEUM: ITS HISTORY AND TREASURES. A view of the Origins of that Great Institution, Sketches of Its Early Benefactors and Principal Officers, and a Survey of the Priceless Objects preserved within its Walls. By Henry C. Shelley. xii and 35 pp. Illustrations and index. L. C. Page & Co., Boston, 1911. $4. 8½ x 6. [An adequate history and description of this institution giving a comprehensive idea of its scope and usefulness.]

SCHOTTLAND UND SEINE BEWOHNER. Skizzen und Studien nach einer Reise. By Direktor Dr. Walter Suck. 59 pp. Map. Kommissionsverlag von Gebr. Köppel, 1911. 8 x 5. [A well-arranged, popular account of Scotland, its people and some of the most attractive tours, including the Hebrides.]

TYPES OF BRITISH VEGETATION. By Members of the Central Committee for the Survey and Study of British Vegetation. Edited by A. G. Tansley. xx and 416 pp. 36 plates, 21 figures in the text, bibliography and index. G. P. Putnam's Sons, New York, 1911. $2. 7½ x 5. [Presents a scientific classification and balanced picture of British vegetation.]

ANGLO-DUTCH RIVALRY DURING THE FIRST HALF OF THE SEVENTEENTH CENTURY. Being the Ford Lectures delivered at Oxford in 1910. By the Rev. George Edmundson. 176 pp., appendix and index. Clarendon Press, Oxford, 1911. $2. 9 x 6. [Describes the long continued clashing of interests that led to the wars between the English and Dutch of the second half of the Seventeenth Century.]

HOME LIFE IN NORWAY. By H. K. Daniels. xi and 298 pp. 12 illustrations and index. The Macmillan Company, New York, 1911. $1.75. 7½ x 5. [An excellent popular account of everyday life in Norway.]

THE RUSSIAN YEAR-BOOK FOR 1911. Compiled and Edited by Howard P. Kennard, M. D. With an introduction by Baron Alphonse Heyking. xv and 387 pp. Maps, illustrations and index. Eyre & Spottiswoode, Ltd., London, 1911. 10s. 6d. 7 x 5. ["A most timely and valuable epitome of Russian affairs. I am of the opinion that it should be in the hands of every one interested in Russia." Basile de Timiriazeff, recently Minister of Commerce in the Russian Government.]

DIE POLARE GRENZE DES WALDES IN RUSSLAND, nach Untersuchungen in der Tundra der Timan-Ssamojeden. Von G. I. Tanfiljef. [In Russian.] 287 pp. Map and illustrations. Odessa, 1911. 9 x 6.

KLUBHÜTTEN-ALBUM DES SCHWEIZER ALPEN-CLUB (Beilage zum Jahrbuch S. A. C. Bd., 46). 117 pp. Maps, plan, illustrations and index. Zentral-Komitt, S. A. C.., 1911. [Views of 70 club huts built in the Alps by the Swiss Alpine Club. The views are from photographs and include the environment of the huts, with accompanying descriptive text and sketch maps.]

LES EXPLORATEURS. Von P. Foncin. 160 pp. Illustrations. Armand Colin, Paris, 1911. Fr. 1.50. [Describes conspicuous achievements of exploration by such pioneers as Binger, Monteil, Livingstone, Stanley, De Brazza, Francis Garnier, Sven Hedin and others.]

HINTS TO METEOROLOGICAL OBSERVERS. Prepared under the Direction of the Council of the Royal Meteorological Society. By William Marriott. Seventh Edition, Revised and Enlarged. 75 pp., 24 illustrations, 13 tables and glossary of meteorological terms. Edward Stanford, London, 1911. 1s. 6d. 9½ x 6.

METEOROLOGIA AGRICOLA. Dei Professori G. Costanzo—C Negro. xi and 206 pp. 27 illustrations, and index. Ulrico Hœpli, Milano, 1911. L.2.50. 6 x 4. [Treats meteorology simply and clearly with particular attention to its relation to agriculture and the needs of students of that branch of industry.]

ALTITUDE TABLES. Computed for Intervals of Four Minutes between the Parallels of Latitude 0° and 30°, and 31° and 60°, and Parallels of Declination 0° and 24° designed for the Determination of the Position-Line at all Hour Angles without Logarithmic Computation. By Frederick Ball. Second Edition. Vol. 1, lx and 245 pp. Vol. 2, lx and 241 pp. Illustrations. J. D. Potter, London, 1910. 15s. 10½ x 7½. [Among the advantages claimed for these Tables is avoidance of the necessity for solving spherical triangles, diminution of clerical work and rapidity in determining the required results.]

THE OXYRHYNCHUS PAPYRI. Part viii. Edited with Translations and Notes. By Arthur S. Hunt. xiv and 314 pp. 7 plates and index. The Egypt Exploration Fund, Boston, 1911. $5. 10½ x 8.

THE JOHN CRERAR LIBRARY. A List of Books on the History of Science. January, 1911. Prepared by Askel G. S. Josephson. 297 pp. Index. The John Crerar Library, Chicago, 1911. 10½ x 7.

THE ANIMALS AND MAN. An Elementary Textbook of Zoology and Human Physiology. By Vernon Lyman Kellogg. x and 495 pp. Illustrations and index. Henry Holt & Co., New York, 1911. 45 cents. 7½ x 5. ["A simple introduction to the study of the structure, physiology, behavior and classification of animals and to the study of the make-up and physiology of the human body."]

FIFTH YEAR GEOGRAPHY OF NEW YORK STATE. 28 pp. Maps and illustrations. American Book Company, New York, 1911. 10 cents. 10 x 8.

SUR LE TERRAIN. Guide pratique de Topographie usuelle à l'usage des Elèves-ingénieurs, des Elèves-topographes et des Aspirants aux Examens et Concours des Ponts et Chaussées. Par E. Liger. 110 pp. Illustrations. H. Dunod et E. Pinat, Paris, 1910. Fr. 2.50. 8 x 5.

ARABIC SELF-TAUGHT. With English Phonetic Pronunciation. By A. Hassam. Enlarged and revised by the Rev. N. Odeh. Fourth Edition. 128 pp. E. Marlborough & Co., London, 1911. 60 cents. 7½ x 4½.

HOME GEOGRAPHY AND TYPE STUDIES. By Alexis Everett Frye. iv and 108 pp. Maps and illustrations. Ginn & Company, New York, 1911. 8 x 6½.

THE SCENIC NEW ENGLAND TOUR BOOK. Covering only the Recommended Routes and Tours in the New England States, the Adirondacks and Harlem Valley. Compiled by Raymond Beck. 212 pp. Maps. Published by Walker Lithograph and Publishing Company, Boston, Mass. 8½ x 4½. [Especially intended for automobilists.]

GUIDE DE LA VILLE DE TURIN. Plan and illustrations. 88 pp. F. Casanova & Cia, Turin, 1911. 8 x 5.

GUIDA ILLUSTRATA DELLA CITTÀ DI TORINO. Map and illustrations. 99 pp. F. Casanova & Cia, Torino. 8 x 4½.

THE MEDITERRANEAN. Seaports and Sea Routes including Madeira, the Canary Islands, the Coast of Morocco, Algeria, and Tunisia. Handbook for Travellers by Karl Baedeker. xxxvi and 607 pp., 38 maps, 49 plans and index. Karl Baedeker, Leipzig, 1911. 12s. 6 x 4½. [This is an entirely new Handbook. The new subjects comprise Madeira and the Canary Islands, the coast of Morocco and Algeria and Tunis.]

SICILIA. Guide Regionali Illustrate. Edite dalla Direzione Generale delle Ferrovie dello Stato. 163 pp. Map and illustrations. Stabilimento Marzi, Rome, 1911 (?). [Many views of art works, antiquities and scenery].

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

United States

BECKWITH, F., M. E. MACAULEY, and M. S. BAXTER. Plants of Monroe Co., New York, and Adjacent Territory. Supplementary List. 38 pp. *Proc. Rochester Acad. of Sci.*, Vol. 5, 1910, Rochester, N. Y.

CARNEY, F. The Economic Mineral Products of Ohio. Reprinted from *Bull. of the Sci. Laboratories of Denison Univ.*, Vol. 16, 1910, pp. 137 181.

CARNEY, F. Geographic Conditions in the Early History of the Ohio Country. Reprinted from the *Bull of the Sci. Laboratories of Denison University*, Vol. 16, 1911, pp. 403 423.

CARNEY, F. Geographical Influences in the Development of Ohio. Reprinted from the *Journ. of Geogr.*, Vol. 9, 1911, pp. 168–173.

CARNEY, F. The Geologic Development of Ohio. Reprinted from the *Bull. of the Sci. Laboratories of Denison Univ.*, Vol. 16, 1911, pp. 365-380.

LAMB, W. A., W. B. FREEMAN and F. F. HENSHAW. Milk River Drainage Basin. *Water-Supply Paper* 266, pp. 110–136, U. S. Geol. Surv., 1911.

LAMB, W. A., W. B. FREEMAN and F. F. HENSHAW. Missouri River Proper. *Water-Supply Paper* 266, pp. 38–40, U. S. Geol. Surv., 1911.

LAMB, W. A., W. B. FREEMAN and F. F. HENSHAW. Platte River Drainage Basin. *Water-Supply Paper* 266, pp. 200–266, U. S. Geol. Surv., 1911.

LAMB, W. A., W. B. FREEMAN and F. F. HENSHAW. Yellowstone River Drainage Basin. Ills. *Water-Supply Paper* 266, pp. 146–192, U. S. Geol. Surv., 1911.

MCGEE, W J. Prospective Population of the United States. *Science*, Vol. 34, 1911, No. 875, pp. 428–435.

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NEW MAPS

Edited by the Assistant Editor

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original), followed by equivalent in miles to one inch. If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

Maps issued by United States Government Bureaus

U. S. Geological Survey

Geologic Sheets Accompanying Folios of the Geologic Atlas of the United States.

Alabama. Birmingham Quadrangle. Surveyed in 1905–06. 1:125,000 (1 in. = 1.97 mile). 34°0′ - 33°30′ N.; 87°0′ - 86°30′ W. Edition of April, 1910. (a) Areal Geology. Contour interval 50 ft. 18 colors. (b) Economic Geology. Interval 50 ft. 22 colors. (c) Structure Sections [structural geology with sections]. 16 colors. Accompany "Birmingham Folio (No. 175)" by C. Butts, 1910.

Colorado. Engineer Mountain Quad. Survey completed in 1908. 1:62,500 (1 in. = 0.99 mile). 37°45′ - 37°30′ N.; 108°0′ - 107°45′ W. Edit. of Sept., 1909. (a) Areal Geology. Interval 100 ft. 22 colors. (b) Structure Sections. 21 colors. Accompany "Engineer Mountain Folio (No. 171)" by W. Cross and A. D. Hole, 1910.

New Jersey–Pennsylvania. Trenton Quad. Surveyed in 1893–1907. 1:125,000. 50°30′ - 40°0′ N.; 75°0′ - 74°30′ W. Edit. of March, 1909. (a) Areal Geology. Interval 20 ft. 33 colors. (b) Structure Sections. 31 colors. Accompany "Trenton Folio (No. 167)" by I. Bascom, N. H. Darton, H. B. Kümmel, W. B. Clark, B. L. Miller and R. D. Salisbury, 1909.

New York. Watkins Glen Quad. Surveyed in 1903–05. 1:125,000. 42°30′ - 42°0′ N.; 77°0 - 76°30′ W. (a) Areal Geology. Interval 40 ft. 10 colors. Edit. of Feb., 1909. (b) Surficial Geology. Interval 40 ft. 14 colors. Edit. of Dec., 1908.

Catatonk Quad. Surveyed in 1905–06. 1:125,000. 42°30′ - 42°0′ N.; 76°30′ - 76°0′ W. (a) Areal Geology. Interval 40 ft. 11 colors. Edit. of Feb., 1909. (b) Surficial Geology. Interval 40 ft. 15 colors. Edit. of Dec., 1908.

Accompany "Watkins Glen-Catatonk Folio (No. 169)" by H. S. Williams, R. S. Tarr and E. M. Kindle, 1909.

North Dakota. Jamestown Quad Surveyed in 1904–05. 1:125,000. 47°0′ - 46°30′ N.; 99°0′ - 98°30′ W. Edit. of March, 1909. (a) Areal Geology. Interval 20 ft. 10 colors. (b) Artesian Water. Interval 20 ft. 5 colors.

Eckelson Quad. Surveyed in 1903–04. 1:125,000. 47°0′ - 46°30′ N.; 98°30′ - 98°0′ W. Edit. of April, 1909. (a) Areal Geology. Interval 20 ft. 16 colors. (b) Artesian Water. Interval 20 ft. 5 colors.

Tower Quad. Surveyed in 1903-04. 1:125,000. 47°0′ - 46°30′ N.; 98°0′ - 97°30′ W. Edit. of April, 1909. (a) Areal Geology. Interval 20 ft. 18 colors. (b) Artesian Water. Interval 20 ft. 6 colors.

Accompany "Jamestown-Tower Folio (No. 168)" by D. E. Willard, 1909.

Pennsylvania. Johnstown Quad. Surveyed in 1906. 1:62,500. 40°30′ - 40°15′ N.; 79°0′ - 78°45′ W. Edit. of May, 1910. (a) Areal Geology. Interval 20 ft. 9 colors. (b) Structure and Economic Geology. Interval 20 ft. 12 colors. Accompany "Johnstown Folio (No. 174)" by W. C. Phalen, 1910.

Pennsylvania. Mercersburg Quad. Surveyed in 1901–07. 1:62,500. 40°0′ - 39°45′ N.; 78°0′ - 77°45′ W. Edit. of April, 1909. (a) Areal Geology. Interval 20 ft. 16 colors. (b) Structure Sections. 17 colors.

Chambersburg Quad. Surveyed in 1901–07. 1:62,500. 40°0′ - 39°45′ N.; 77°45′ - 77°30′ W. Edit. of April, 1909. (a) Areal Geology. Interval 20 ft 17 colors. (b) Structure Sections. 18 colors.

Accompany "Mercersburg-Chambersburg Folio (No. 170)" by G. W. Stose, 1909.

Pennsylvania. Sewickley Quad. Surveyed in 1906–08. 1:62,500. 40°45′ - 40°30′ N.; 80°15′ - 80°0′ W. Edit of Feb., 1910. (a) Areal Geology. Interval 20 ft. 10 colors. (b) Structure and Economic Geology. Interval 20 ft. 12 colors. (c) Oil and Gas. Interval 20 ft. 15 colors. Accompany "Sewickley Folio (No. 176)" by M. J. Munn, 1911.

Pennsylvania-New York. Warren Quad. Surveyed in 1907. 1:62,500. 42°0′ - 41°45′ N.; 79°15′ - 79°0′ W. Edit. of Aug., 1909. (a) Areal Geology. Interval 20 ft. 19 colors. (b) Economic Geology. Interval 20 ft. 8 colors. Accompany "Warren Folio (No. 172)" by C. Butts, 1910.

Wyoming. Laramie Quad. Surveyed in 1905. 1:125,000. 41°30′ - 41°0′ N.; 106°0′ - 105°30′ W. Edit. of Sept., 1909. (a) Areal Geology. Interval 50 ft. 20 colors. (b) Structure Sections. 20 colors. (c) Artesian Water. Interval 50 ft. 10 colors.

Sherman Quad. Surveyed in 1905–08. 1:125,000. 41°30′ - 41°0′ N.; 105°30′ - 105°0′ W. Edit. of Sept., 1909. (a) Areal Geology. Interval 50 ft. 22 colors. (b) Structure Sections. 22 colors.

Accompany "Laramie-Sherman Folio (No. 173)" by N. H. Darton, E. Blackwelder and C. E. Siebenthal, 1910.

Maps Accompanying Publications.

ALABAMA. Map of faulted areas in the Vicinity of Pratt City and Thomas. [1:54,000 (1 in.=0.85 mile)]. [33°32′ N. and 86°60′ W.]. Fig. 8, Birmingham Folio (No. 175), 1910, *Geol. Atlas of the U. S.*

ALASKA. [Ten maps accompanying "Geology and Mineral Resources of Parts of the Alaska Peninsula" by W. W. Atwood. *Bull.* 467, 1911:]

(a) Outline Map of Southwestern Alaska. Showing area under consideration (Pl. VI) and smaller areas included in certain maps in this report. [1:4,700,000 (1 in.=74.2 miles)]. [62° - 54° N.; 166° - 148° W.]. Pl. I.

[Shows routes of recent explorations].

(b) Geologic Reconnaisance Map of the Alaska Peninsula. 1911. From charts 8802 and 8502 of the Coast and Geodetic Survey. Geology compiled in 1909 by W. W. Atwood, based on surveys by W. W. Atwood, H. M. Eakin, G. C. Martin, T. W. Stanton, A. G. Maddren and J. E. Spurr. Mercator's Projection [equatorial scale: 1:1,830,000; mean meridional scale 1:1,000,000 (1 in.=15.8 miles)]. 59°8′ - 54°18′ N.; 165°0′ - 153°10′ W. 15 colors. Pl. VI.

[Valuable general geologic map of the peninsula on a large scale].

(c) Reconnaissance [Topographic] Map of Herendeen Bay and Unga Island Region, Alaska. 1911. Surveyed in 1908 by H. M. Eakin. Contour interval 200 ft. 1:250,000 (1 in.=3.95 miles). 56° - 55° N.; 161°0′ - 160°10′ W. 3 colors Pl. II.

(d) Reconnaissance Geologic Map of the Herendeen Bay and Unga Island Region, Alaska. 1911. Geology by W. W. Atwood, 1908. Same scale and coordinates as map (c). 19 colors. Pl. VIII.

[Geology superimposed on topographic map, Pl. II].

(e) Geologic Reconnaissance Map of Chignik Bay Region. Topography by H. M. Eakin. Geology by W. W. Atwood. Surveyed in 1908. Contour interval 200 ft. 1:250,000. 56°32′ - 56°9′ N.; 159° - 158° W. 13 colors. Pl. VII.

(f) Geologic sketch map of Cape Douglas and vicinity by R. W. Stone. [1:160,000 (1 in.=2.5 miles)]. [58°57′ - 58°43′ N.; 153°35′ - 153°10′ W.]. Fig. 4.

(g) Sketch map of shore features near south entrance to Baralof Harbor, Unga Island. [1:36,000]. (1 in.= 0.57 mile)]. [55°12′ N. and 160°31′ W.] Fig. 11.

(h) Sketch map of shore features near north [south] entrance to Baralof Harbor, Unga Island. [1:36,000]. [55°12′ N. and 160°31′ W.]. Fig. 12.

(i) Sketch map of the shore features near the head of Balboa Bay, which had been selected as a railroad terminus. [1:50,000 (1 in.=0.79 mile)]. [55°36′ N. and 160°36′ W.]. Fig. 16.

(j) Sketch map of a portion of Prospect Bay showing the form of the harbor and the location of copper prospects. [1:40,000 (1 in.=6.3 miles)]. [Near 56⅓° N. and 158½° W.]. Fig. 18.

COLORADO. (a) Topographic Map of the Southern Portion of the Lake City Quadrangle, Colorado, Showing the approximate locations of patented mining claims. Surveyed in 1903. Contour interval 100 ft. 1911. 1:62,500 (1 in =0.99 mile). 38°5′ - 38°0′ N.; 107°30′ - 107°15′ W. 2 colors.

(b) Geologic Map of the Southern Portion of the Lake City Quadrangle, Colorado. Geologic survey completed in 1909. 1911. 1:62,500. 38°2′30″ - 38°0′0″ N.; 107°30′ - 107°15′ W. 17 colors.

(c) Topographic map of the region around Lake San Cristobal. Contour interval 100 ft. [1 in.= 1 mile (1:63,360)]. [38°0.0′ - 37°57.3′ N.; 107°15.0′ - 107°19.5′ W.].

[S. E. continuation of map (a)].

(d) Index map of a portion of Colorado, showing the location of the mining region discussed in this report. [1 in.=60 miles (1:3,801,600)]. 39 1/5° - 36 4/5° N.; 109⅓ - 105⅓° W.

Pls. I and II, Figs. 20 and 1, "Geology and Ore Deposits near Lake City, Colorado" by J. D. Irving and H. Bancroft, *Bull.* 478. 1911.

EAST-CENTRAL UNITED STATES. Map of the southern part of the Appalachian province showing its physiographic divisions and its relation to the Coastal Plain. [1:11,000,000 (1 in.=173.6 miles)]. [39°40′ - 32°10′ N.; 88°0′ - 74°30′ W.]. Fig. 2, Birmingham (Ala.) Folio (No. 172), 1910, *Geol. Atlas of the U. S.*

MIDDLE ATLANTIC STATES. Map of the northern part of the Appalachian province, showing its physiographic divisions and its relation to the Coastal Plain province. [1:7,800,000 (1 in.=123.1 miles)]. [42°20′ - 37°0′ N.; 83°40′ - 73°30′ W.]. Fig. 2, Warren Folio (No. 172), 1910, Johnstown Folio (No. 174), 1910, and Sewickley Folio No. 176, 1911, *Geol. Atlas of the U. S.*

NORTH AND SOUTH DAKOTA, ETC. Sketch map showing the southern limit of the Pleistocene ice sheet and the distribution of moraines of the Dakota glacial lobe in North and South Dakota. Compiled largely from maps by J. E. Todd, Warren Uphham and the author [D. E. Willard]. [1:3,400,000 (1 in.=53.7 miles)]. [47°40′ - 40°30′ N.; 101°0′ - 96°20′ W.]. Fig. 2, Jamestown-Tower Folio (No. 168), 1909, *Geol. Atlas of the U. S.*

North Dakota. Sketch map of the Jamestown, Eckelson and Tower quadrangles, showing depth to base of till. [1:050,000 (1 in.=102.3 miles)]. [47°0′ - 46°30′ N.; 99°0′ - 97°30′ W.]. Fig. 5, Jamestown-Tower Folio (No. 168), 1909, *Geol. Atlas of the U. S.*

Pennsylvania. Structure of the rocks of the Warren quadrangle shown by contours on the top of the Salamanca conglomerate member which represent the approximate elevation of this member above sea. [1:190,000 (1 in.=30.0 miles)]. [42°0′ - 41°45′ N.; 79°15′ - 79°0′ W.]. Fig. 14, Warren Folio (No. 172), 1910, *Geol. Atlas of the U. S.*

Pennsylvania. (a) Convergence map showing by lines of equal distance the vertical distance between the Ames limestone member and the Hundred-foot sand in the Sewickley quadrangle. [1:190,000 (1 in.=30.0 miles)]. [40°45′ - 40°30′ N.; 80°15′ - 80°0′ W.].

(b) Axes of folds in the Ames limestone member and the Hundred-foot sand in the Sewickley quadrangle. Same scale and coordinates as map (a).

Figs. 5 and 6, Sewickley Folio (No. 176), 1911, *Geol. Atlas of the U. S.*

Pennsylvania-Maryland. Relief Map of Cumberland Valley, the Appalachian valley ridges, and South Mountain in southern Pennsylvania. 1 in.=10 miles (1:633,600). [40°21′ - 39°38′ N.; 78°8′ -76°50′ W.]. Fig. 2, Mercersburg-Chambersburg Folio (No. 170), 1909, *Geol. Atlas of the U. S.* [Photograph of a reiief model].

Pennsylvania-New York (a) Sketch map of the Watkins Glen and part of the Catatonk quadrangles and adjacent portion of Pennsylvania, showing location of anticlinal and synclinal axes. [1 in.=22 miles (1:1,393,920)]. 43°30′ - 41°30′ N.; 78°0′ - 76°15′ W.

(b) Sketch map of western New York, showing distribution of morainal deposits and direction of ice movement. From maps of Chamberlin, Leverett, Fairchild and Tarr. [1:3,600,000 (1 in.=56.8 miles)]. [43°45′ - 41°30′ N.; 79°50′ - 75°5′ W.]. .

(c) Sketch map of glacial Lake Newberry in west-central New York. After H. L. Fairchild. [1:2,000,000 (1 in.=31.6 miles)]. [43°45′ - 41°55′ N.; 78°20′ - 75°40′ W.].

Figs. 10, 11 and 13, Watkins Glen-Catatonk Folio (No. 169), 1909, *Geol. Atlas of the U. S.*

Pennsylvania-New York, etc. Map showing the distribution of the glacial deposits of Pennsylvania and adjoining portion of New York. Compiled by Wm. C. Alden, 1901. 1 in.=approx. 40 miles (1:2,500,000). [42°15′ - 40°25′ N.; 80°15′ - 74°45′ W.]. Fig. 12, Warren Folio (No. 172), 1910, *Geol. Atlas of the U. S.*

Pennsylvania-Ohio-New York, etc. Sketch map showing the probable preglacial drainage of western Pennsylvania. (After Leverett, with slight changes). [1:3,000,000 (1 in.=47.3 miles)]. [42°35′ - 39°30′ W.; 81°10′ - 78°0′ W.]. Fig. 16, Warren Folio (No. 172), 1910, and Fig; 3, Sewickley Folio (No. 176), 1911, *Geol. Atlas of the U. S.*

Wyoming. Structure of the Laramie quadrangle shown by contours on the top of the Casper formation representing elevations above sea. [1:390,000 (1 in.=6.2 miles)]. [41°30′ - 41°0′ N.; 106°0′ - 105°30′ W.]. Fig. 3, Laramie-Sherman Folio (No. 173), 1910, *Geol. Atlas of the U. S.*

Bureau of the Census

Washington. [Four cartograms entitled:] (1) Per Cent. of Increase or Decrease of Population of Washington, by Counties: 1909–1910. (a) Total Population. (b) Rural Population. (2) Density of. Population of Washington by Counties: 1910. (a) Total Population. (b) Rural Population. [1:4,400,000 (1 in.=69.4 miles)]. Accompany, on pp. 5 and 6, "Population, Washington." *Bull. Thirteenth Census of the United States: 1910*, [1911].

NORTH AMERICA

North America. Geologic Map of North America Compiled by the United States Geological Survey in Cooperation with the Geological Survey of Canada and Instituto Geologico de Mexico under the Supervision of Bailey Willis and George W. Stose. Geologic drafting by Henry S. Selden. 1911. 4 sheets. 1:5,000,000 (1 in.=78.91 miles). 85° - 5° N.; 180° - 12° W. 42 colors. With two insets on same scale: (1) Aleutian Islands. 55° - 50° N.; 188° [sic] - 163° W. (2) Windward Islands. 19° - 8° N.; 67° - 59° W. Pl. I, "Index to the Stratigraphy of North America" by Bailey Willis, *Prof. Paper.* 71, 1912. (Also sold separately for 75 cents.)

[For detailed review of this standard map. which is the second edition of the one published on the occasion of the Tenth International Geological Congress at Mexico, 1906, see *Bull.*, Vol. 44, No. 1, 1912, pp. 40–44].

United States

United States. Gray's New Railway System Map of the United States, Dom. of Canada and Mexico. Compiled from Latest Official Sources, showing carefully selected lists of Cities & Towns in readable type for quick reference. C. P. Gray, Map Maker, 130 Fulton Street, New York. 4 sheets. [1:2,750,000 (1 in.=43.4 miles)]. 55° - 24° N.; 129° - 63° E. 35 colors.

An excellent large-scale general map distinguishing the railroad systems of the United States by separate colors. The map is a good example of efficiency in the use of color symbols. Although relatively few colors are used, upwards of 100 railroad systems are so clearly delineated as not to allow of a moment's doubt as to the identity of any line. This is attained by judicious use of differentiated symbols (full, broken, dotted lines, etc. in different colors) and by avoiding the use of the same color symbol to denote contiguous or overlapping systems. An index allows of the location by rectangular coordinates of 02 railroad systems.

For an equally snccessful treatment of the railroad systems of Great Britain and Ireland, see Harmsworth's Atlas (Geo. Philip & Son, London) Pls. 21–22, 23-24, 30, 37–38].

Canada

Northwest Territories. (a) Plan of Churchill Harbour. By Lieut. A. R. Gordon, R.N. Asstd. by J. W. Tyrrell, P.L.S. 1 in.=2,000 ft. (1:24,000). 58°45′ N. and 94°10′ W. 2 colors.

(b) Chart of York Roads. By Lieut. A. R. Gordon, R.N. Asst. by J. W. Tyrrell, P.L.S. 1 in.=12,000 ft. (1:144,000). 92°30′ W. and 57°0′ N. 3 colors.

Accompany, following p. 334, "Report on the Dominion of Canada Government Expedition to the Arctic Islands and Hudson Strait on board the D.G.S. *Arctic*" by J. E. Bernier, Ottawa, 1910.

CENTRAL AMERICA AND WEST INDIES

Greater Antilles. Map of the Isle of Pines. [1:800,000 (1 in.=12.6 miles)]. 22°0′ - 21°25′ N.; 83°15′ - 82°35′ W.]. Accompanies "A Caribbean Island" by J. Fortescue, *Bull. Pan Amer. Union*, Vol. 33, No. 4, 1911, pp. 706–721.

SOUTH AMERICA

Bolivia. Position of the River Heath. [1:8,000,000 (1 in.=126.3 miles)]. 9° - 17° S.; 72° - 64° W. Accompanies "The River Heath." *Bull. Pan Amer. Union*, Vol. 33, No. 4, 1911, pp. 769–766.

[Cf. map facing p. 436, *Bull.*, Vol. 42, No. 6, 1910, and map listed under "Bolivia," *Bull.*, Vol. 43, No. 5, 1911, p. 391].

Chile. [Mapa de Chile. Ejecutado por órden de S. E. el Presidente de la República, Exmo. Sr. D. Pedro Montt. Officina de Mensura de Tierras. Edicion Centenaria. 1910. (Maps *c–g*, 1911)]. 1:500,000 (1 in =7.89 miles). 5 colors. Sheets (no individual title): (a) 47° - 49° S.; 76°0′ - 70°50′ W. (b) 49° - 51° S.; 76°0′ - 70°50′ W. (c) 51° - 53° S.; 76°0′ - 70°50′ W. (d) 51° - 53° S.; 71°0′ - 65°30′ W. (e) 53° -55° S.; 76°0′ - 70°50′ W. (f) 53° - 55° S.; 71° - 65°30′ W. (g) 55° - 57° S.; 71° -65°30′ W.

[Official map of Chile on relatively large scale. Above sheets embrace Territorio de Magallanes. Statistics of the Territory on map (d). Index of place-names on reverse of each sheet. The complete map consists of 22 sheets, each occupying two degrees of latitude. Some of the other sheets listed in *Bull.*, Vol. 41, No. 9, 1909, p. 600, and Vol. 43, No. 5, 1911, p. 391].

Chile-Argentina. Track Chart of the Straits of Magellan. [1:3,200,000 (1 in.=50.5 miles)]. 52°20′ - 54°30′ S.; 75°10′ - 68°0′ W. 1 color. Accompanies, facing p. 146, Vol. I, "The Andean Land" by C. S. Osborn, Chicago, 1909.

Falkland Islands. [Map of] Falkland Islands. [1:2,300,000 (1 in.=36.3 miles)]. 52° - 52½° S.; 62° - 57° W. 1 color. Accompanies, facing p. 110, Vol. I, "The Andean Land," by C. S. Osborn, Chicago, 1909.

AFRICA

Belgian Congo. The Itimbiri River and Country between the Welle and Aruwimi Rivers. From prismatic compass traverses and astronomical observations by Messrs. C. A., A. E. H. and R. L. Reid. 1:750,000, or 1 in.=11.84 miles. 3°45′ - 1°50′ N.; 22°25′ - 26°50′ E. 2 colors. With list of geodetic positions and inset showing general location of main map, 1:15,000,000 (1 in.=236.74 miles). Accompanies "Messrs. C. A. and A. E. H. Reid's Surveys in the Northern Congo Basin," *Geogr. Journ.*, Vol. 38, No. 6, 1911, pp. 591–592.

[Cf. also map of Aruwimi R. by R. L. Reid, listed in *Bull.*, Vol. 43, No. 10, 1911, p. 797].

Belgian Congo. (a) Léopoldville en 1889. [1:7,000 (1 in.=0.11 mile)]. 4¼° S. and 15⅓° E. With inset: Stanley Pool. 1:700,000 (1 in.=11.05 miles). (b.) Léopoldville en 1910. No scale. Pls. IV and V, "Les villes du Congo: Léopoldville" by Mahieu, *Revue Congolaise*, Vol. 2, No. 2, 1911, pp. 125–140.

British and German East Africa. Mombasa-Victoria (Uganda) Railway. 1:1,584,000, or 1 in.=25 miles. 0°45′ N. - 4°45′ S.; 31° - 31°0′ - 40°30′ E. 2 colors. Intelligence Division, War Office. April, 1909.

[Shows stations on Uganda Railway and steamer routes on Victoria Nyanza].

Cape of Good Hope. Sketch showing the position of Le Vaillant's Grotto [31°57′ S. and 18°34′ E.]. 1:1,000,000, or 1 in.=15.78 miles. 31°22′ - 32°25′ S.; 17°48′ - 18°55′ E. Accompanies "Le Vaillant's Grotto at Heerenlogement" by H. H. W. Pearson, *Geogr. Journ.*, Vol. 39, No. 1, 1912, pp. 40-47.

Eritrea. Carta dimostrativa della Colonia Eritrea e delle Regioni Adiacenti alla scala di 1:400,000 (1 in.=6.31 miles). 5 colors. Instituto Geografico Militare, Rome, 1909 and 1910. 14 sheets. F[oglio] 1: Basso Barca. 18° - 16° N.; 36° - 38° E. F.2: Nacfa. 18° - 16° N.; 38° - 40° E. F 3: Isole Farisan. 18° - 16° N.; 40° - 42° E. F.4: Abù Arisc'. 18° - 16° N.; 42° - 44° E. F.5: Agordat. 16° - 14° N.; 36° - 38° E. F.6: Asmara. 16° - 14° N.; 38° - 40° E. F.7: Baia d'Amfilè. 16° - 14° N.; 40° - 42° E. F.8: Hodèida. 16° - 14° N.; 42° - 44° E. F.9: Gondar. 14° - 12° N.; 36° - 38 E. F.10: Macallè. 14° - 12° N.; 38° - 40° E. F.11: Edd. 14° - 12° N.; 40° - 42° E. F11bis: Hadelè Gubò. 12° - 11° N.; 40° - 42° E. F.12: Assab. 14° - 12° N.; 42° - 44 E. F.12 bis: Gibuti. 12° - 11° N.; 42° - 44° E.

[Valuable official map of the Colony of Eritrea on a relatively large scale. Drainage in blue, relief in brown hachures, vegetation in green, roads and tribal names in red. Sources given on each sheet. Title on Foglio 4. Index map listed under Europe, "Italy and Colonies," (g)].

Eritrea. [Index maps of Maps of Eritrea 1:50.000, 1:100,000, 1:400,000. See under Europe, "Italy and Colonies," (e), (f), (g).].

Italian Somaliland. [Index map of Map of Italian Somaliland, 1:200,000. See under Europe, "Italy and Colonies," (h)].

Kamerun, Etc. La Route de la Bénoué au Tchad. [1:13,000,000 (1 in.=208.0 miles)]. [13° N. - 1½° S.; 8½° - 21° E.]. With two insets: (1) Du Mayo-Kebbi au Logone (in two parts). [1:700,000 (1 in.=11.0 miles)]. [10°0′ - 9°40′ N.; 13°50′ - 16°0′ E.]. (2) [Map of west-central Africa for comparison. 1:50,000,000]. Accompanies "La Voie de la Bénoué" by Capt. Mercier, *Renseign. Colon.*, 1911, No. 11, pp. 276–285.

[Inset (1) a detailed map of the French route of access to the Chad Territory through Kamerun].

Kamerun-French Congo, etc. Das Kamerun-Kongo-Abkommen zwischen dem Deutschen Reich und Frankreich vom 4. November 1911. 1:5,000,000 (1 in.=78.91 miles). 14°30′ N. - 6°40′ S.; 4°40′ - 20°30′ E. 11 colors. With two insets: (1) Der deutsche Kongozipfel. 1:2,000,000 (1 in.=31.56 miles). 0° - 1°30′ S.; 16°25′ - 18°0′ E. 5 colors. (2) Süd-deutschland im Massstab der Hauptkarte. 1 color. Taf. 43, "Das deutsch-französiche Kamerun-Kongo-Abkommen vom 4. November 1911" by H. Wichmann, *Pet. Mitt.*, Vol. 57, II, Dec., 1911, pp. 332–333.

[In content and execution the best current presentation of this subject-matter. An example of the ready facilities of the Perthes geographical establishment to meet any cartographic demand of the moment.

The map, which is a photo-lithographic enlargement of the corresponding sheet in Stieler's

Hand-Atlas, shows the boundaries of the territorial changes, the "concessions" allotted to the various exploiting companies, with their name, the French telegraph line from the Ubangi to Loango, French routes of access through foreign territory and the limit of the Free Trade Zone of the Congo Basin, according to the Berlin Conference of 1885. Inset (1) shows the German access to the Congo].

Kamerun-French Congo, etc. (a) L'Afrique Equatoriale d'après l'accord Franco-Allemand. 1:10,000,000 (1 in.=157.83 miles). 15° - 6° S.; 6° - 20⅛° E.

[In content practically as complete as Taf. 43, *Pet. Mitt.*, listed above; in some respects more legible because with critical nomenclature].

(b) Détail de la Frontière sur la Sangha. 1:1,500,000 (1 in.=23.67 miles). [2°20′ - 1°10′ N.; 15°30′ - 16°30′ E.].

(c) Détail de la Frontière sur le Congo. 1:1,500,000. [0°20′ - 0°40′ S.; 16°30′ - 17°40′ E.].

(d) Détail de la Frontière sur l'Oubangui. 1:1,500,000. [4°20′ - 3°10′ N.; 18°0′ - 18°40′ E.].

Accompany "Accord franco-allemand du 4 novembre 1911 relatif au Congo" [text], *l'Afrique Franç.*, Vol. 21, No. 11, 1911, pp. 413–415.

[Maps (b), (c) and (d) valuable detailed maps of the critical districts involved in the agreement; typical of the valuable material, mostly original, embodied in the maps of *l'Afrique Française*].

Kamerun-French Congo, etc. La "Coupure" Projetée en Septembre 1911. (Extrait du *Temps* du 16 septembre). [Original German demands for cession of territory in French Congo]. [1:25,000,000 (1 in.=394.6 miles)]. [13½° N. - 6° S.; 8° - 26° E.]. Accompanies comment on Franco-German agreement of Nov. 4, 1911, by A. Terrier, *l'Afrique Franç.*, Vol. 21, No. 11, 1911, pp. 417–419.

Kamerun-French Congo, etc. Sketch Map showing Cessions of Territory in Equatorial Africa provided for by the Franco-German Treaty of November, 1911. 1:12,000,000, or 1 in.=189.39 miles. 14⅔° N. - 6¼° S.; 7⅔° - 20° E. Accompanies "Franco-German Territorial Arrangement," *Geogr. Journ.*, Vol. 38, No. 6, 1911, pp. 622–624.

Kamerun-French Congo, etc. The Franco-German Congo Agreement. [1:12,500,000 (1 in.=197.3 miles)]. 14° N. - 7° S.; 6 2/5° - 20° E. With two insets on same scale: (1) Togo, Dahomey, etc. [11° - 5½° N.; ½° W. - 3½° E.] (2) Scotland for comparison. Accompanies note with same title, *Scott. Geogr. Mag.*, Vol. 27, No. 12, 1911, p. 659.

[This map, on inset (1), incorrectly indicates the cession to France, on the part of Germany, of a strip of territory lying east of the Upper Mono R. in Togo. Although this cession was broached during the negotiations in September it was not incorporated into the final agreement of Nov. 4, 1911. Cf. *l'Afrique Franç.*, Vol. 21, No. 11, 1911, p. 417].

Morocco. (a) Das Bergland westlich von Fas [Fez]. Entworfen und gezeichnet von Prof. Dr. P. Schnell. (P. Schnell: Zur Kartographie von Nordmarokko. Blatt I.). 1:200,000 (1 in.=3.16 miles). 34°23′ - 33°42′ N.; 6°2′ - 40°58′ W. 4 colors.

(b) Übersichtskarte der Peilungen zu Blatt 1: Das Bergland westlich von Fas. (Zur Kartographie Nordmarokkos). Von Prof. Dr. Paul Schnell. 1:300,000 (1 in.=4.73 miles). [35°5′ - 33°48′ N.; 6°5′ - 40°57′ W.].

Taf. 30, "Zur Kartographie Nordmarokkos" by P. Schnell, *Pet. Mitt.*, Vol. 57, II, Nov., 1911, pp. 257–261, and Taf. 42, Vol. 57, II, Dec., 1911.

[Map (a) an exhaustive critical compilation of all available material. Relief in approximate contours and shading in brown, drainage in blue, vegetation and agriculture (six symbols) in green, explorers' routes, thirty in number, in red. Map (b) shows the aximuth traverses on which map (a) is based].

Morocco, Rio de Oro, etc. Les zones d'influence de l'Espagne au Maroc d'après le traité de 1904. [1:11,800,000 (1 in.=186.2 miles)]. 37° - 19⅔° N.; 18° - 1⅔° W. Accompanies "Les accords franco-espagnols" by A. Terrier, *l'Afrique Franç.*, Vol. 21, No. 11, 1911, pp. 446–452.

Morocco. Zone d'Influence Espagnols du Projet de 1902. (Carte du *Figaro*). [1:3,800,000 (1 in.=60.0 miles)]. 36°10′ - 33°20′ N.; 7°40′ - 1°20° W. Accompanies "Les accords franco-espagnols" by A. Terrier, *l'Afrique Franç.*, Vol. 21, No. 11, 1911, pp. 446–452.

Rhodesia—Nyasaland—Portuguese East Africa, etc. Map to illustrate the paper by Sir Alfred Sharpe, K.C.M.G., C.D., L.LD., on British Central Africa. 1:5,000,000, or 1 in.=78.91 miles. 6° - 20° S.; 27° - 41° E. 3 colors. Accompanies "The Geography and Economic Development of British Central Africa" by A. Sharpe, *Geogr. Journ.*, Vol. 39, No. 1, 1912, pp. 1–22.

[Valuable compilation based on route and boundary surveys, Admiralty charts, new official maps of Southern Rhodesia and Nyasaland and Beringer's Map of North-Eastern Rhodesia].

Western Africa. (a) Itinéraire du voyageur [from Algiers to Gâo on the Niger]. [1:40,000,000 (1 in.=631.3 miles)]. [35° - 3° N.; 20° W. - 10° E.].

(b) Carte des chemins de fer de l'Afrique Occidentale Française. [1:26,000,000 (1 in.=410.4 miles)]. [19° - 2° N.; 20° W. - 9° E.].

Accompany, on pp. 11 and 263, "Notre Beau Niger" by F. Dubois, Paris, 1911.

ASIA

Asia. Map Illustrating Russian Advance in Asia. 1 in.=331 miles (1:19,872,160), With inset of west-central Asia showing the advance of Russia's Asiatic boundary. [1:21,800,000]. 56° - 33° N.; 35° - 93° E. Accompanies, facing p. 188, "Afghanistan: The Buffer State" by G. Lyons, London, 1910.

Bokhara. Map of the Emirate of Bokhara. On the basis of the Russian 40-verst map with additions by O. Olufsen. [1:1,700,000 (1 in.=26.8 miles)]. 42½° - 36½° N.; 59° - 73° E. 2 colors. Accompanies "The Emir of Bokhara and his Country" by O. Olufsen, London, 1911.

[Valuable because of its relatively large scale. Mountains in brown shading; symbol for desert; principal roads shown].

Celebes. Central Celebes Showing the Explorations of E. C. Abendanon, 1909 10. 1:3,000,000, or 1 in.=47.34 miles. 0°20′ N. - 4°25′ S.; 119°10′ - 121°55′ E. Accompanies "Central Celebes," *Geogr. Journ.*, Vol. 38, 1911, No. 6, pp. 594–598.

[Based on map published in *Tijds. Kon. Nederl. Aardr. Genoot.* Cf. *Bull.*, Vol. 43, No. 7, 1911, p. 549].

Ceylon. [Map of] Ceylon. 12 miles to an inch (1:760,320). 10°0′ - 6°10′ N.; 79°15′ - 82°0′ E. 7 colors. Survey Dept., Colombo, 1910].

[Standard official general map of Ceylon. Political divisions shown by areal coloring].

China. (1) Itinéraire de Yun-nan-fou à Sin-pou-tse, sur le Yang-tseu, levé par le Dr. Legendre. 1:1,500,000 (1 in.=23.67 miles). [26°20′ - 25°0′ N.; 101°10′ - 102°40′ E.].

(2) Itinéraire de Yae-si-hien à Fou-lin (Yun-nan), levé par le Dr. Legendre. 1:1,500,000. [29°25′ - 28°40′ N.; 102°40′ - 103°15′ E.]. With inset showing location of maps (1) and (2).

Figs. 23 and 24, "Exploration dans le Yun-nan et dans le Sseu-tch'ouan" by A. F. Legendre, *La Géogr.*, Vol. 24, No. 4, 1911, pp. 225–232.

Dutch East Indies. (a) [Sixteen maps entitled:] Barrière-Riffen en Atollen in den Oost-Indischen Archipel. Samengesteld tot toelichting van het artikel van Prof. J. F. Niermeyer door C. Craandijk. 1 color. 1. Westkust Sumatra. 1:500,000 (1 in.=7.89 miles). 0°30′ S. and 100°0′ E. 2. Zuid-ingang Straat Makasser. 1:1,000,000 (1 in.=15.78 miles). 5° S. and 117° E. 3. Oostkust Borneo. 1:500,000. 1°30′ N. and 119° E. 4. Noordkust Golf van Tomini. 1:500,000. 0°30′ N. from 120 3/5° to 122 2/5° E. 5. Straat Makasser. Borneo-bank. 1:1,000,000. 2° S. and 118° E. 6. Golf van Tomini. 1:200,000 (1 in.=3.16 miles). 0°50′ S. and 120°20′ E. 7. Golf van Tomini. Togian-eilanden. 1:200,000. 0°20′ S. and 121°40′ E. 8. Westkust Celebes. 1:1,000,000. 5° S. and 119° E. 9. Golf van Tomini. Togian-eilanden. 1:200,000. 0°30′ S. and 122°10′ E. 10. Noord- en Oostkust eiland Wangi Wangi. 1:100,000. 5°18′ S. and 123°36′ E. 11. Oostkust Celebes. 1:500,000. 2° S. and 122° E. 12. Noordkust Flores. 1:500,000. 8°30′ S. and 121°30′ E. 13. Oostkust Borneo. Moearas-rif. 1:400,000. 1°50′ N. and 118°55′ E. 14. Mapia-eilanden. 1:200,000. 0°55′ N. and 134°18′ E. 15. O kust Borneo. Eiland Maratoea. 1:400,000 (1 in.=6.31 miles). 2°15′ N. and 118°35′ E. 16. Angelika-droogte. 1:100,000. 7°46′ S. and 122°18′ E.

(b) Atolvormige Riffen (Vervolg van Krt. XIII). 17. Sermata-eilanden. Meatij Miarang-rif. 1:250,000 (1 in =3.95 miles). 8°22′ S. and 128°30′ E. 18. Rif "de Bril." 1:200,000. 6°4′ S. and 118°55′ E. 19. Noordkust Flores. Gosong Boni. 1:200,000. 8°23′ S. and 122°14′ E. 20. Rif in de Golf van Tomini. 1:200,000. 0°24′ N and 120°32′ E. 21. Golf van Tomini. Lalanga-rif. 1:200,000. 1°2′ S. and 120°40′ E. 22. Noordkust Java. Riffen nabij Boompjes-eiland. 1:200,000. 5°50′ S. and 108°20′ E.

Overzichtskaartje aangevende Barrière Riffen en Atollen nabij. Celebes en de Kleine Soenda-eilanden. 1:6,500,000 (1 in.=102.58 miles). 2½° N. - 11° S.; 114½° - 125½° E.

[Valuable general map showing barrier reefs and atolls. Indicates by number location of reefs shown on large-scale maps 1–22].

Kaart No XIII and XIV, "Barrière-Riffen en Atollen in de Oost-Indiese Archipel" by J. F. Niermeyer, *Tijds. kon. Nederl. Aardr. Genoot.*, Vol. 28, No. 6, 1911, pp. 877-894.

India. [Map of India showing the route of the German Crownprince, Nov. 1910–Feb. 1911, and of Dr. Wegener in 1898, 1906 and 1910-1911]. 1:20.000,000 (1 in.=315.65 miles). [38° - 5° N.; 62° - 102° E]. Taf. 6, "Das heutige Indien . . ." (first part) by G. Wegener, *Ztschr. Gesell. Erdk. Berlin*, 1911, No. 8, pp. 521–452.

Java. Sedoelang-eilanden (Noordkust van Java) in 1884. 1,200,000 (1 in.=3.16 miles). 6°6′ - 6°15′ S.; 107°30′ - 107°41′ E. Accompanies "Het dalen van de Sedoeleng-eilanden op de Noordkust van Java" by C. Craandikj, *Tijds. kon. Nederl. Aardr. Genoot.*, Vol. 28, No. 6, 1911, pp. 927–928.

Korea. [Map of] Korea. 1:4,080,000, or 1 in.=64.39 miles. 43° - 33° N.; 124° - 131½° E. 2 colors. Accompanies "The Story of Korea" by J. H. Longford, New York, 1911.

The Nearer East. Map illustrating Russian Advance in Central Asia. [1 in.=128 miles (1:8,110,080)]. 42° - 23° N.; 43° - 79° E. Accompanies, facing p. 52, "Afghanistan: The Buffer State" by G. Lyons, London, 1910.

AUSTRALASIA AND OCEANIA

Dutch New Guinea. Schets van den loop der Idenburg-rivier. 1:1,000,000 (1 in.=15.78 miles). [20°45′ - 3°55′ S.; 138°10′ - 139°45′ E.]. Accompanies "De Idenburg-Rivier." *Tijds. kon. Nederl. Aardr. Genoot.*, Vol. 28, 1911, No. 6, pp. 962–964

[Map of the Mamberamo R., of which the Idenburg is a right affluent, listed in *Bull.*, Vol. 43, No. 7, 1911, p. 550].

New Guinea. Loop der Keizerin Augusta-rivier (Nieuw-Guinea) bij de grens van het Ned. gebied. 1:1,000,000 (1 in =15.78 miles). [4° - 5° S.; 140° - 141½° E.]. Accompanies ". . . uit het Jaarsverslag van den Topographischen Dienst in Ned. Indië over 1910" by J. J. S., *Tijds. kon. Nederl. Aardr. Genoot.*, Vol. 28, No. 6, 1911, pp. 954–962.

[Map of the head of the Kaiserin Augusta R. Detailed map of lower course listed under German New Guinea in *Bull.*, Vol. 43, No. 5, 1911, p. 392].

Victoria. (a) Victoria classified according to its productiveness. 16 miles to 1 inch (1:1,013,760). 33 4/5° - 39° S.; 140¾° - 150¼° E. 5 colors. Crown Lands Dept., Melbourne. Aug. 1907. 2/6.

[Distinguishes between land adapted to wheat growing, grazing land, agricultural land, land adapted to fruit growing, and forest and timber reserves].

(b) Victoria Showing Positions of Butter Factories (creameries not indicated). Same scale and coordinates as map (a). 1 color. Jan., 1907. On reverse of map (a).

EUROPE

France. Carte aéronautique. 1:200,000 (1 in.=3.16 miles). 5 colors. Sheets: (1) Amiens. 50°13′ - 49°28′ N.; 1°53′ - 3°40′ E. (2) Châlons. 49°28′ - 48°46′ N.; 3°40′ - 5°24′ E. (3) Mézières. 50°12′ - 49°29′ N.; 3°40′ - 5°28′ E. (4) Paris. 49°29′ - 48°46′ N.; 1°54′ - 3°40′ E. Service Géographique de l'Armée. 1.50 frs. a sheet.

[Sheet Châlons previously listed in *Bull.*, Vol. 43, No. 11, 1911, p. 878. Limiting coordinates approximate only. They do not coincide with margin of each sheet, as the projection used is drawn for the whole map and not for each sheet as a unit. Decimal system of angular measure used].

Germany. (a) Skizze der Entwicklung des Darss. 1:200,000 (1 in.=3.16 miles). [54°25 N. and 12°30′E].

(b) Skizze der alteren und jungeren Dunengenerationen der Kurischen Nehrung bei Schwarzort, zum Teil nach eigenen Aufnahmen. 1:50,000 (1 in.=0.79 mile). [55°32′ N. and 21°10′ E.].

Figs. 44 and 52, "Einige Ergebnisse entwicklungsgeschichtlicher Studien an europäischen Flachlandsküsten und ihren Dünen" by G. Braun, *Ztschr. Gesell. Erdk. Berlin*, 1911, No. 8, pp. 543–560.

Italy and Colonies. [Fourteen index maps of Italian government maps:] (a) Quadro d'Unione dei Fogli della Carta d'Italia [I] alla scala di 1:100,000, [II] divisi per quadranti alla scala di 1:50,000, e [III] per tavolette alla scala di 1:25,000. 1:1,500,000 (1 in.=23.67 miles): (1) I. Sezione [western northern Italy]. (2) II. Sezione [eastern northern Italy]. (3) III. Sezione [north-central Italy]. (4) IV. Sezione [south-central Italy]. (5) V. Sezione [Sardinia]. (6) VI. Sezione [southern Italy] (7) VII. Sezione [Sicily].

(b) Quadro d'Unione della Granda Carta Topografica del Regno d'Italia alla scala di 1:100,000. Edizione (A) in nero a tratteggio, (B) policroma a sfumo, (C_1) in nero senza tratteggio, (C_2) policr. senza sfumo. [1:6,000,000 (1 in.=94.7 miles)].

(c) Quadro d'Unione della Carta Corografica d'Italia alla scala di 1:200,000. [1:8,000,000 (1 in.=126.3 miles)].

(d) Quadro d'Unione della Carta Corografica del Regno d'Italia e delle Regioni Adiacenti alla scala di 1:500,000. [1:10,600,000 (1 in.=167.3 miles)].

(e) Quadro d'Unione della Carta Topografica della Colonia Eritrea alla scala di 1:50,000. [No geographic outline; limits of sheets only]. (f) Quadro d'Unione della Carta Topografica della Colonia Eritrea alla scala di 1:100,000. [1:1,000,000 (1 in.=15.8 miles)]. [16°0′ - 14°20′ N.; 37°40′ - 40°20′ E.]. (g) Quadro d'Unione della Carta Dimostrativa della Colonia Eritrea e delle Regione Adiacenti alla scala di 1:400,000 [1:8,000,000]. [18° - 11° N.; 36° - 44° E.].

(h) Quadro d'Unione della Carta Dimostrativa della Somalia Italiana alla scala di 1:200,000. [1:6,300,000 (1 in.=99.4 miles)]. 5°20′ N. - 0°40′ S.; 42° - 49° E.

Taf. 33 (I–VII)–38, "Die moderne Kartographie des Königreichs Italien und seiner Kolonien" by A. Mori, *Pet. Mitt.*, Vol. 57, II, Nov., 1911, pp. 277–280.

The Netherlands. Duinen tusschen Scheveningen en Katwijk. 1:100,000 (1 in.=1.58 miles.) [52°10′ N. and 4°20′ E.], Accompanies "Over den Vorm van het Grondwatervlak in het Duin" by E. Dubois, *Tijds. kon. Nederl. Aardr. Genoot.*, Vol. 28, No. 6, 1911, pp. 895–902.

[Gives the names of the sand dunes between the two places mentioned].

Russia. Militärgeographische Skizze des Polesie (West-Russland). Entworfen von Hauptmann G. Kuchinka. 1:1,500,000 (1 in.=23.67 miles). 54°15′ - 50°0′ N.; 23°0′ - 31°30′ E. 4 colors. Taf. 40, "Das Polesie im westlichen Russland" (conclusion) by G. Kuchinka, *Pet. Mitt.*, Vol. 57, Nov., 1911, pp. 296–298.

Scotland. (a) [Four] Maps of Edinburgh District. (Sheet 32 of Ordnance Survey). 1:126,720=2 miles to an inch. 56°2′ - 55°48′ N.; 3°36′ - 2°59′ W. (1) Topography. 14 colors. (2) Geology. 18 colors. (3) Hydrography. 3 colors. (4) Distribution of Population According to Buildings. 3 colors.

(b) The Esk near Polton. [1:20,000 (1 in.=0.32 mile)]. [56°52.0′ N. and 3°8.4′ W.].

(c) Map showing the Borthwick dry valley. [1:42,000 (1 in.=0.66 mile)]. [55°51.4′ - 55°48.0′ N.; 3°3.0′ - 3°59.0′ W.].

(d) Mean Annual Rainfall [of Edinburgh District]. [1:480,000 (1 in.=7.8 miles)]. Same coordinates as maps listed under (a).

(e) Map showing density of population and number of inhabitants in each parish [Edinburgh District], 1911. Same scale and coordinates as map (d).

Accompany "Notes on the Geography of the Edinburgh District" by J. Cossar, *Scott. Geogr. Mag.*: maps (a), (b) and (c), as separate plate and Figs. 8 and 11, first part, Vol. 27, No. 11, 1911, pp. 574–600; map (d), second part, Vol. 27, No. 12, 1911, pp. 643–654; map (e), conclusion, Vol. 28, No. 1, 1912, pp. 10–30.

POLAR.

Antarctic Regions. South Georgia: Sketch Map showing the Whaling Grounds and the course usually taken by the "Humpback" and "Right Whale," from October to March. By J. Innes Wilson. 1:2,000,000, or 1 in.=31.56 miles. 53½° - 55°⅓° S.; 38 2/5° - 35½° W. With inset: Sketch Map of N.W. part of South Georgia from the latest information received from whalers and sealers. 1:1,000,000, or 1 in.=15.78 miles. 53⅞° - 54½° S.; 38⅛° - 36 3/5° W. Accompanies "The Coast of South Georgia," *Geogr. Journ.*, Vol. 39, No. 1, 1912, pp. 77–79.

[Embodies valuable new material.]

Arctic Regions. (a) Discoveries in the Arctic Sea. With Additions and Changes to 1909 by Capt. J. Bernier. [Mercator's Projection: equatorial scale 1:5,900,000. Mean meridional scale 1:1,600,000 (1 in.=25.3 miles)]. 79°45′ - 65°40′ N.; 128°0′ - 66°30′ W. 2 colors. With inset: Continuation of Land North of Smith Sound Chiefly from the British Arctic Expedition, 1875-6. [1:2,600,000 (1 in=41.0 miles)]. 83½° - 79° N.; 85° - 45° W.

[Shows, on revised Admiralty chart, route of Capt. Bernier's expeditions of 1906–7 and of 1908–09.]

(b) Portion of Chart showing Second officer Morin's and Third officer Green's Tracks to Banks Land and Victoria Island from Winter Hbr. Voyage of C. G. S. *Arctic*, 1908–09. [Same projection and scale as map (a).] 78° - 71° N.; 128° - 99½° W. 3 colors.

(c) Winter Harbour, Melville Island, Arctic Sea. 1909. [1:30,000 (1 in.=0.47 mile)]. [74°48′ N. and 110°55′ W.]. 1 color.

(d) [Map of Jones Sound by Gunnar Isachsen]. [Mercator's Projection: equatorial scale 1.2,000,000. Mean meridional scale 1:446,000 (1 in.=7.9 miles)]. 77° - 75⅔°; 91° – 81° W.

[Facsimile of MS. map found by Capt. Bernier on Cone Island, Jones Sound, in Aug. 1907. Original survey of south coast of Ellesmere Land, subsequently published in the report on the *Fram* Expedition of 1898–1902 under Sverdrup].

Accompany "Report on the Dominion of Canada Government Expedition to the Arctic Islands and Hudson Strait on board the D. G. S. *Arctic*" by J. E. Bernier, Ottawa, 1910.

Arctic Regions. (a) Geological Sketch Map of the Northern Islands of Canada. Geographical outlines those of map published by Department of Interior, 1904. Geology from results of various expeditions. [1:4,700,000 (1 in.=74.2 miles)]. 90° - 61° N.; 130° - 20° W.

(b) Sketch Map of Southern Portion of Melville Island. [With indications of the geology]. [1:2,360,000 (1 in.=37.3 miles)]. 76° - 74° N.; 115° - 105° W.

Accompany, in pocket and on p. 449, "Geological Report of Arctic Expedition, 1908–09," by

J. G. McMillan, pp. 382–491 of "Report of the Dominion of Canada Government Expedition to the Arctic Islands and Hudson Strait . . ." by J. E. Bernier, Ottawa, 1910.

[Map (a) a valuable general geologic map of the Arctic Archipelago embodying the results of all previous geologic exploration].

Greenland. (a) The Eastern Settlement of Greenland. From F. Jónsson, 1899. [1:2,100,000 (1 in.=33.1 miles)]. 61°18′ - 59°42′ N.; 47°12′ - 43°0′ W.

(b) The Western Settlement of Greenland. From F. Jónsson, 1899. [1:4,000,000 (1 in.=63.1 miles)]. 67° - 63° N.; 54° - 49° W.

Accompany "The Norsemen in America" by F. Nansen. *Scott. Geogr. Mag.*, Vol. 27, No. 12, 1911, pp. 617–632.

[Show the locations of the ruins of the homesteads of the ancient Greenlanders. Reproduced from Nansen's "In Northern Mists"].

WORLD AND LARGER PARTS.

Northern Europe and North America. Countries and Seas Discovered by Norwegians and Icelanders. [1:50,000,000 (1 in.=789.1 miles)]. 82° - 40° N.; 75° W. - 70° E. Fig. 5. "The Norsemen in America" by F. Nansen, *Geogr. Journ.*, Vol. 38, No. 6, 1911, pp. 557–580.

OCEANOGRAPHICAL.

Australasian Mediterranean. [Wind- und Stromverhältnisse auf der Fahrt von Singapore nach Friedrich-Wilhelmshafen vom 17. Oktober bis 10. November 1910]. [Mercator's Projection: equatorial scale: 1:24,000,000]. 4° N. - 10° S.; 103° - 149° E. Accompanies note with same title, *Ann. Hydrogr. u. Marit. Meteorol.*, Vol. 39, No. 11, 1911, pp. 662–624.

Indian and Pacific Oceans. [Map of steamship routes between Durban and Nagasaki or Yokohama]. [Mercator's Projection: equatorial scale 1:100,000,000]. 38° N. - 35° S.; 27° - 143° E. Accompanies "Dampferwege von Durban nach Japan oder Sibirien," *Ann. Hydrogr. u. Marit. Meteorol.*, Vol. 39, No. 11, 1911, pp. 504–591.

Kattegat-Baltic Sea. Tiefenkarte der Beltsee, von Dr. Hans Spethmann. 1:340,000 [1 in.= 53.66 miles). 56°19′ - 53°53′ N.; 90°24′ - 13°30′ E. 6 colors. With inset: Nordende des kleinen Beltes. 1:50,000 (1 in.=0.79 mile). [55°30′ N. and 9°40′ E.]. Taf. 29, "Tiefenkarte der Beltsee" by H. Spethmann, *Pet Mitt.*, Vol. 57, II, Nov., 1911, pp. 246–251.

[Critical combination embodying recent soundings in the straits of the Danish archipelago. Six depths indicated.]

North Atlantic Ocean. [Eight maps entitled:] Oberflächentemperatur and der Nordwestafrikanischen Küste. Jan.–Apr. 1910. Jan.–Apr. 1911. [Mercator's Projection: equatorial scale 1:28,000,000]. 30° - 5° N ; 20° - 14° E. Taf. 30. "Oberflächentemperatur des Nordwestafrikanischen Auftriebgebietes" by A. C. R., *Ann. Hydrogr. u. Marit. Meteorol.*, Vol. 39, No. 11, 1911, pp. 593–595.

HISTORICAL.

Arctic Regions. (a) Arctic Discoveries and Explorations up to July, 1853. [Mercator's Projection: equatorial scale 1:7,000,000. Mean meridional scale 1:1,750,000 [1 in.=27.6 miles)]. 78° - 70° N.; 125° - 90° W. 5 colors.

[Facsimile of MS. map found by Capt. Bernier among records left by Capt. Henry Kellett, H.M S. *Resolute*, on Melville Island in 1852–53. Indicates by whom the various sections of the coast were surveyed].

(b) [Facsimile Chart of Behring Strait, 1852. (McClure.) [Mercator's Projection: equatorial scale 1:11,800,000]. 74° - 63° N.; 173½° - 153½° W.

(c) [Facsimile Track Chart, H M. Sledge *Success*, Barrow Strait, 1851]. [Mean scale 1:900,000 (1 in.=14.2 miles)]. 75°0′ - 73°50′ N.; 99° - 95° W.

Accompany: Map (a) in separate envelope, maps (b) and (c) following p. 334, "Report on the Dominion of Canada Government Expedition to the Arctic Islands and Hudson Strait on board the D.G.S. *Arctic*" by J. E. Bernier, Ottawa, 1910.

Korea. (a) The Three "Han" [political divisions of Korea at the beginning of the Christian era]. [1:8,400,000 (1 in.=132.6 miles)]. [43° - 33° N.; 126° - 131° E.].

(b) The Three Kingdoms [about 600 A. D.]. Same scale and coordinates as map (a).

Accompany, on pp. 61 and 67, "The Story of Korea" by J. H. Longford, New York, 1911.

South America. Map of South America. For the Rev. Dr. Robertson's History of America. By Thos. Kitchen, Senr., Hydrographer to his Majesty. Published . . . Septr. 29th, 1777, by W. Strahan and T. Cadell in the Strand. [Facsimile]. [1:28,000,000 (1 in.=441.9 miles)]. Accompanies, facing p. 44, Vol. 2, "The Andean Land" by C. S. Osborn, Chicago, 1909.

Tasmania. (a) Bays on the South-East Coast of Tasmania, from Lieut. Bond's Log. [Linear scale incorrect; should be 1:340,000 approx. (1 in.=5.4 miles)]. [43°23′ S. and 147°33′ E.]. [Facsimile].

(b) Part of South-Eastern Tasmania, from Hayes's Chart. [No scale. 1:770.000 approx. (1 in.= 12.2 miles)]. [42°45′ - 43°40 S.; 146°40′ - 147°40′ E.]. [Facsimile].

Accompany "A Forgotton Navigator: Captain (Afterwards Sir) John Hayes, and his Voyage of 1793" by I. Lee, *Geogr. Journ.*, Vol. 38, No. 6, 1911, pp. 580–590.

CARTOGRAPHICAL.

Austria-Hungary. [Extracts from the Generalkarte von Mitteleuropa, 1:200,000, sheet Trient]. [46°30′ - 46°10′ N.; 11°10′ - 11°50′ E.]. 16 colors. Accompanies "Luftschiffahrt und Landkarte" by K. Peucker, facing p. 360 in Hoernes: "Buch des Fluges," and "Verfahren zur Herstellung farbenplastischer Darstellungen, insbesondere Karten (Flugkarten)" by K. Peucker, *Österreichische Patentschrift* Nr. 48671, k k. Patentamt, Vienna, 1911.

[Map on the contour system of coloring, mainly for aeronauts. Specimens given of relief represented by contours and shading, by contours without shading and by shading without contours in addition to the color layers. Cf. review, *Bull.*, Vol. 43, No. 6, 1911, p. 465.]

The South Pole is situated on a great ice plateau, which was named King Haakon VII Plateau, a name which must be held to include the ice cap in all directions beyond 89° S. The temporary camp was named Polheim. Here they stayed until Dec. 17, making more careful observations.

On Dec. 17 the explorers started back, and favorable weather made the return journey easier than the journey to the Pole. They reached Framheim on January 25, 1912.

While Amundsen and his party were away south, Lieutenant Prestud and two others made a trip to King Edward Land, confirming Captain Scott's observations and bringing back numerous geological specimens.

The *Fram* arrived at the Bay of Whales on January 9, and on January 16, the Japanese expedition also arrived there and landed on the Barrier. The *Fram* then left the Bay of Whales on January 30, and, after a slow voyage with contrary winds, arrived at Hobart, Tasmania, on March 7, 1912.

Of the services to geography of Amundsen in the South Polar regions, one must write with the most unstinted praise and admiration. While it is impossible to draw absolutely final conclusions about them until Amundsen publishes some charts and until Scott's results are announced, it may be stated now that Amundsen has solved more problems and more important problems than anyone else. The main results of Amundsen's well planned trip are five in number:—the attainment of the South Pole: the discovery that Antarctica is one continent and not two land masses: the settlement of the boundaries of the Great Ice Barrier: the discovery of 500 miles of the coast line of West Antarctica: the discovery that the ocean does not wholly freeze over in the far south.

The attainment of the South Pole was a great physical feat. It is a feather in Amundsen's cap and will doubtless remain his most enduring title to fame. It was the greatest geographical prize remaining, and Amundsen well deserves any honors he may receive for it, even if, and it does not seem likely, Scott reached it first. Amundsen's journey was well conceived and admirably carried out. It seems strange, however, that Amundsen's was only the third definite attempt to reach the South Pole. First came Scott, then Shackleton, then Amundsen. Their journeys followed the law of evolution, Scott breaking the way for Shackleton, and Shackleton in turn doing so for Amundsen. The discovery of the South Pole is a most important discovery, and all geographers of to-day must feel pleased that it was made in their lifetime. Is it as important, however, geographically and scientifically as the solving of the mysteries of the continent and of the Ice Barrier?

In considering whether the most important result of Amundsen's trip is not the settling of the question of Antarctica being one or two land masses, it is necessary to look back a little. Since de Gerlache opened the ball of Antarctic scientific investigations, two schools, so to speak, have formed themselves of believers in one land mass or in two land masses. For instance, in 1910, Dr. Penck published, in connection with the Filchner expedition, a map* showing West Antarctica and East Antarctica separated by a blank space between Weddell Sea and Ross Sea, marked "Land oder See?" On the contrary, in 1911, Dr. Bruce published a little chart† showing Antarctica as one mass. The writer himself, remembering Sam Weller's remark, "Not knowing, can't say," has always avoided committing himself on this matter, which at best was mere guesswork. Thanks to Amundsen, the question is settled and there can be no reasonable doubt that Antarctica is one whole continental land mass, with at least two large gulfs in it, something like the Gulf of Carpentaria and the Great Australian Bay in Australia. Wilkes's name The Antarctic Continent and Murray's name Antarctica are therefore thoroughly justified by actual proof.

The next greatest geographical problem solved by Amundsen is that of the Great Ice Barrier. This also has long been a mystery. Some geographers have held that it was bounded by mountains, others that it connected with the icy shores of Weddell Sea. It turns out that it is bounded by mountains. This settles the geographical part of the problem. This does not, however, although much has been learned, settle the scientific part of the problem. The push to the Barrier, which slowly sends its ice northwards, is left unexplained in Amundsen's report. He says of the Axel Heiberg Glacier, which lies beyond the coast mountains, that its broad cracks and open crevices were apparently mostly filled up, as the glaciers in all probability long ago stopped moving. He says nothing, however, of the glaciers abutting directly on to the Barrier. It would seem therefore most probable that it is the innumerable coastal glaciers which flow from the mountains surrounding the Barrier, which supply at least part of the motive power which shoves this immence ice mass forward. If so, and although many of the phenomena—such as how much of the ice is formed by the freezing of the salt water surface and the building up of this ice by long years of snowfall—are unusual and sometimes peculiar to the Antarctic regions, yet it seems now as if the Great Ice Barrier and similar formations sometimes called shelf ice or bay ice must be accepted more than heretofore as being akin to true glaciers.

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* *Zeitschrift der Ges. für Erdkunde*, Berlin, 1910: republished by Dr. Otto Nordenskjöld; *Die Schwedische Südpolar Expedition*, 1911, p. 66.

† *Polar Exploration*, p. 8.

The mountain range discovered by Amundsen and named by him Queen Maud Range, rises on a land which is as yet nameless. This land is a part of the coast line of West Antarctica, for, between 86° S. and King Edward Land, it forms the eastern shore of the great bay or gulf whose western shore is South Victoria Land, which gulf is known as the Ross Sea in its northern reaches and as the Great Ice Barrier in its southern frozen portion. It is indispensable that this coastal land, some 500 miles long, should have, like all other stretches of the coast of Antarctica, a name of its own, to enable geographers to speak of it distinctively and accurately, and I suggest christening it by its self-evident name of Amundsen Land.

The discovery that there was open water during the winter close to the Barrier is a most interesting fact which no one even dreamed of before now. Everything so far noted as yet, has shown that the surface of the ocean round the Antarctic shores freezes during the winter, and finding open water at that period off the Ice Barrier is most remarkable. Why this should be so with the extremely low temperatures noted at the same time is a mystery, and one offering room for much speculation and further observation.

Almost as interesting as the discoveries of Amundsen are the reported landings, cabled from Tasmania on March 13, 1912, of two parties from the Australian expedition, on the steamship *Aurora,* at two points of Antarctica. One party is under Dr. Mawson, the other under Mr. Wild, both members of Shackleton's expedition. The cablegram stated that one party was at Adélie Land, the other at Termination Land. This is welcome news, for it proves finally and absolutely the existence of Wilkes Land.

The cablegram, however, says that the *Aurora* found no trace of the Clarie coast, from which it is inferred that it was an ice barrier that has broken up since D'Urville discovered it in 1838. We must hope for further information before long on this interesting matter. Wilkes states that beyond the ice barrier, which was about one hundred and fifty feet in height, the outline of the high land could be well distinguished and that he called it Cape Carr. It must also be noted that D'Urville's dates on his Antarctic trip are incorrect and given as one day earlier than they really were, and that it was not D'Urville who discovered the Clarie coast on January 29, 1840, but Lieutenant Ringgold, U. S. N., commanding the

U. S. S. Porpoise of Wilkes' expedition, who did so on January 30, 1840: a fact established by Rear Admiral John E. Pillsbury, U. S. N.*

It is a pity that America let slip her opportunity of herself vindicating the most important geographical discovery ever made by an American, when in 1909 and 1910, a number of scientific societies, among them the American Geographical Society, urged the United States Government to send a Navy expedition to re-explore Wilkes Land. But Americans must be grateful to Dr. Mawson, Mr. Wild, and their Australian comrades, for proving, by the actual treading of its snows, that Wilkes Land exists where Wilkes located it. And we may hope for further news by this time next year.

Charles Wilkes was a New Yorker, born in the City of New York, April 3, 1798. He is certainly one of her most famous sons, whose fame is bound to grow in the centuries to come. Why does not New York take some action to honor him, by putting up a statue or some other memorial to the man who first announced to the world that there is a great Antarctic Continent? There are some good sculptors in New York City to whom such a monument could be safely intrusted.

In looking towards the future, is it not questionable whether the discovery of the South Pole so early in the game is not rather a misfortune than a blessing? To the average person, Antarctic discovery meant reaching the South Pole, and now that the greatest incentive to which appeal could be made has been eliminated, when money is required for further exploration it will be much harder to get, for the average person holds the purse strings. Fortunately there are two other expeditions actually in the Antarctic, that of Dr. Mawson in Wilkes Land, that of Lieutenant Filchner in the Coats Land region, and these may be expected to bring back much valuable knowledge.

But there are other portions of Antarctica of which we still know almost nothing. West Antarctica, between Charcot Land and King Edward Land, from W. long. 75° to W. long. 150°, is a blank on the maps. De Gerlache and Charcot both felt the continental shelf in sounding, the first in the neighborhood of 85° W., the second in about 120° W. But *terra incognita* can still be written there on the charts. So it can be between 15° W. and 85° E., between Coats Land and Kaiser Wilhelm Land, for, except the two landfalls of Biscoe and Kemp at Enderby Land and Kemp Land, nothing whatever is known of that immense area of the surface of the globe. There may be mountain ranges, or ice cap plateaus, or huge gulfs, but no one knows. And unfortunately such problems do not appeal to the public. We can only live in hope that Charcot may find the wherewithal with which to pursue his investigations in West Antarctica, and that some one will undertake the exploration of Western East Antarctica. If an American Antarctic expedition should ever be thought of again, the region in which further effort would now be most fruitful would be precisely that of Western East Antarctica, between Enderby Land and the South Pole.

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* *The National Geographic Magazine*, Vol. XXI, 1910, pp. 171–173.

Philadelphia, March 20, 1912.

ECONOMIC PROSPECTS OF NEW BRITISH COLUMBIA

BY

FRED. A. TALBOT

Enterprises in British Columbia have hitherto been content chiefly to exploit the mineral and agricultural wealth in the southern part of the province within easy reach of the first Canadian transcontinental railroad. The northern land has commonly been regarded as an inhospitable mountain region capable of little development. Pioneering did not pass beyond the Cariboo gold field district until a few years ago, and even then was attended with considerable hardship and privation.

The physical features of the region were responsible for this neglect. The Canadian Pacific Railway is flanked by the Rocky, Selkirk, and Gold Mountain ranges and a bad bit of alkali plateau where life is quite insupportable. The presence of this narrow but arid belt was sufficient to deter all excepting those interested in mining and prospecting, and kept pioneer farmers from venturing northward. Entrance to the northern land by way of the Fraser River was impossible owing to the cañons and gulches through which the stream rushes at frantic speed, making it unnavigable.

The discovery of gold in the Klondike prompted a few gold seekers to wander from the northern limit of the Cariboo road through the unknown country beyond. Some pushed on from Barkerville, the leading town in the Cariboo gold country, gaining the southern bank of the Fraser River at Giscombe Portage. They crossed the river and then trekked overland for a few miles to Summit Lake, one of the fountain heads of the Peace River, followed the Parsnip River north till it reaches the Peace and then struck out overland to the northwest and Dawson. Others gained the Fraser River at Soda Creek, the south limit of navigation on its upper reaches, and then struck directly northwards. As they advanced they were astonished to find that the interior became a succession of rich fertile valleys. Many of the gold seekers abandoned their journey to the Klondike to settle upon the land, while others, after gaining the goldfields and failing to meet with fortune, retraced their footsteps to the agricultural stretches of New British Columbia, to settle upon the land. The result is that the oldest settlers in this country to-day are Klondike sourdoughs, who have won more wealth from the alluvial soil in the wide depressions among the low hills than they could obtain from the rocks and rivers of the Yukon Territory.

The real opening of the country, however, is coming from the construction of the second trans-continental railroad across Canada—The Grand Trunk Pacific. This line traverses the richest and most promising areas, for the track usually follows the waterways so long as they flow in the desired direction; and as soon as one river is left, another waterway is picked up. The result is that the railroad has a low ruling grade—not exceeding 21 feet per mile—and indeed the summit level between the Yellowhead Pass in the Rocky Mountains and the seaboard at Prince Rupert is approximately the same as that on the prairies between the Yellowhead Pass and Winnipeg.

I spent a part of 1910 crossing through the heart of this country by packhorse and canoe, the journey occupying nearly six months. My purpose was to study the economic possibilities of the country, and its general physical characteristics. At that time the Grand Trunk Pacific had been advanced westwards from Winnipeg to the west limit of the prairie division, and the construction forces were preparing to attack the mountain section. The official boundary between the prairie and mountain divisions is Wolf Creek, just above the junction of this stream with the Mac Leod River, a mile west of the present station of Thornton. Wolf Creek lies at an elevation of 2,855 feet, while the railroad at the Yellowhead Pass, 130 miles beyond, is at 3,720 feet.

Physically, the country changes abruptly at this point. The rolling prairie, with its gentle undulations, gives way to heavy rolling country, low hills of increasing height rise one above the other, and are separated by the winding course of the Mac Leod River. Poplar is interspersed with jack-pine growing in gravelly soil, but there are numerous patches, often of large area, where the cottonwood

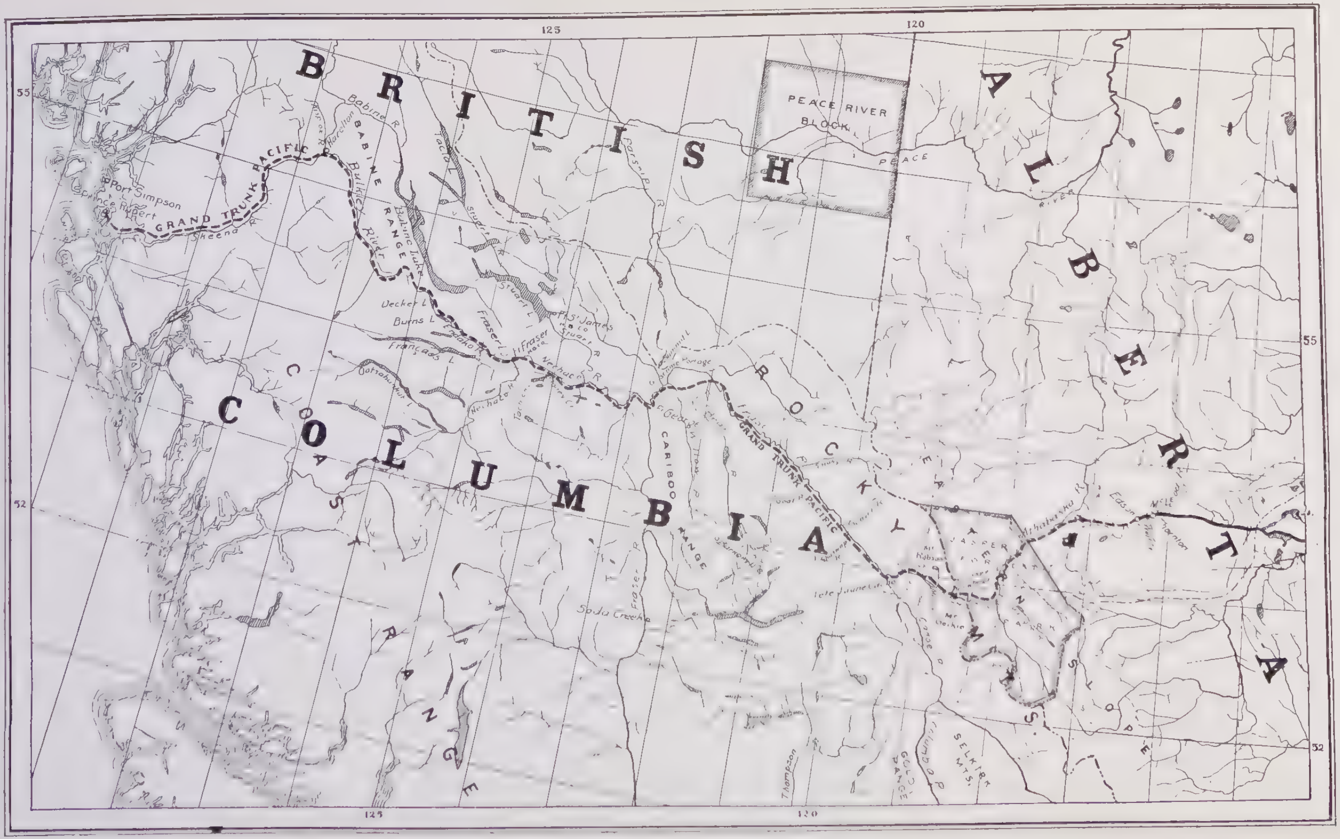

Fig. 1—Sketch Map showing the route of the "Mountain Section" of the Grand Trunk Pacific Railway. Scale 1:6,300,000 (1 in. = 100 miles approx.), Based on the Map of Western Canada, 1:2,217,600, published by the Department of the Interior, Ottawa, 1910,

flourishes luxuriantly, and the dark loamy soil gives every promise of profitable farming. Agriculture here, however, holds out hope of success only to truck farmers, for the surface is too broken to admit of plow cultivation. The hill slopes dropping towards the river in a series of steps, and with a southerly aspect, should prove excellent for fruit farming. The country is well watered, bubbling creeks are found on every hand, and stock-raising should be successful. The upper sides of the hill slopes are covered with a heavy growth of grasses affording fine feed, and the area of these grazing areas can be extended.

The land makes a somewhat steep ascent in the course of the first fifty miles as the Athabaska Divide has to be crossed. As the Divide is climbed the character of the country changes. The whole of these slopes was formerly covered with fine timber, but about forty years ago the trees were destroyed by a fire that devastated over 150 square miles. The result is that the ground is piled with deadfall hidden from view by a high growth of bush. The soil is rocky and for the most part worthless, though it might prove excellent for summer grazing if cleared. Drainage would be required, however; our progress was prolonged by the prevalence of muskeg.

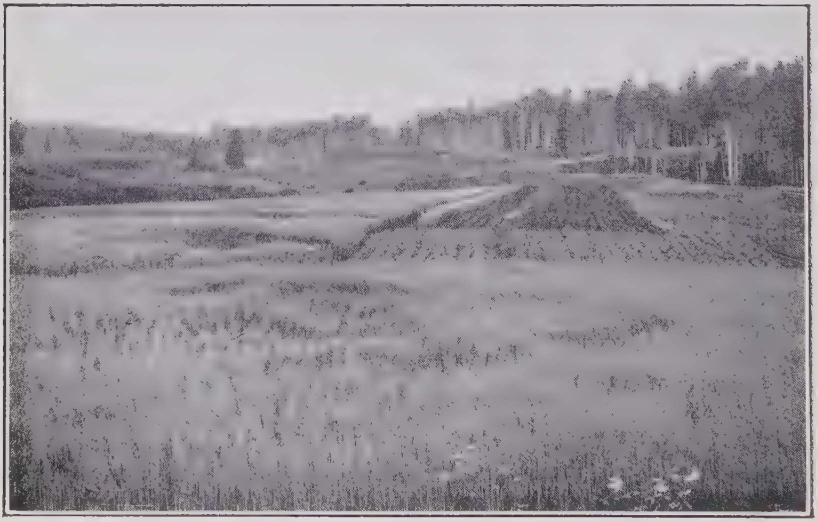

Fig. 2—Oats and barley near Stony Creek, Nechaco Valley, B. C.

The trail crosses the Divide at about 5,000 feet, but the railroad passes the ridge at a lower elevation—3,560 feet—some miles to the north. The descent of the western slopes is somewhat easier, inasmuch as there is a depression having a mean altitude of about 3,200 feet lying between the Divide and the Yellowhead Pass of the Rockies. There are many fertile areas in this district, but they will not be open to the farmer because this district has been set apart by the Dominion Government as a National Park which, with its heavy timber and other primeval characteristics, extends over an area of 5,000 square miles to the western border of Alberta in the Yellowhead Pass. It has been named the Jasper Forest Park. This country was once the home of game, but the Indians have well-nigh depleted the forests of animal life, though it is hoped, by extending protective measures and evicting the Indians, that the remnants will be able to propagate freely, so that the enclosure may again become stocked with bear, lynx, deer, beaver, etc., as well as fowl of all descriptions.

At the point where the Athabaska debouches from the mountains the rift in the foothills is about a mile wide, the waterway occupies the greater part of this space, the main channel is about 600 or 700 feet across, and many sloughs and lakelets constitute the flood-water courses on either side. The river swings along in an north-easterly course at about eight miles an hour, widening at frequent intervals to form large lakes. On the north bank the foothills, almost bare of plants, rise abruptly and the exposed strata are penetrated by many dykes and much folded. The foothills range in height from 5,000 to 8,000 feet, and on the eastern and northern faces are precipitous and bare.

Once the portal is entered, the mountains fall back somewhat, forming a huge amphitheatre in which Jasper Lake is a conspicuous feature. On one side, the lake, which is merely a widening of the Athabaska River, is flanked by the bow-shaped Fiddleback Range, the peaks of which vary from 8,000 to 10,000 feet in height; while on the other sides the mountains rise to about the same altitude.

The entrance to the Rocky Mountains promises to become of importance. High up on the slopes of the Roche à Miette hot springs of therapeutic value, and the hottest so far discovered in Canada, are to be exploited; while on the southern bank of the Athabaska overlooking the Grand Trunk Pacific Railway, a rich bed of coal has been struck. This is evidently an extension of the Brazeau coal field which has been tapped as far south as Calgary, and in greater richness within easy distance of Edson, about twelve miles west of Wolf Creek. In Jasper Park the seams were found a few feet below the surface. The coal is a low grade anthracite similar in character to some coals found in the English fields. It is of excellent calorific value. The seams dip beneath the Athabaska River to reappear upon the northern bank. Some 13 square miles of this coal field have been surveyed, and development work is now under way.

The Athabaska follows a gently winding course between two towering and almost vertical, cliffs. On a wide bench at the foot of the northern cliff the railroad is being built. Majestic mountain scenery is on every hand; the dominating feature being Mount Geikie (11,000 feet), while to the southwest is Simpson Pass, where the Athabaska takes its rise. On the south side, the river is swelled by the Maligne River, flowing from the lake of that name and which for a great part of its distance plunges through a subterranean tunnel, formed evidently by large masses of rock having become detached from the mountain slopes above.

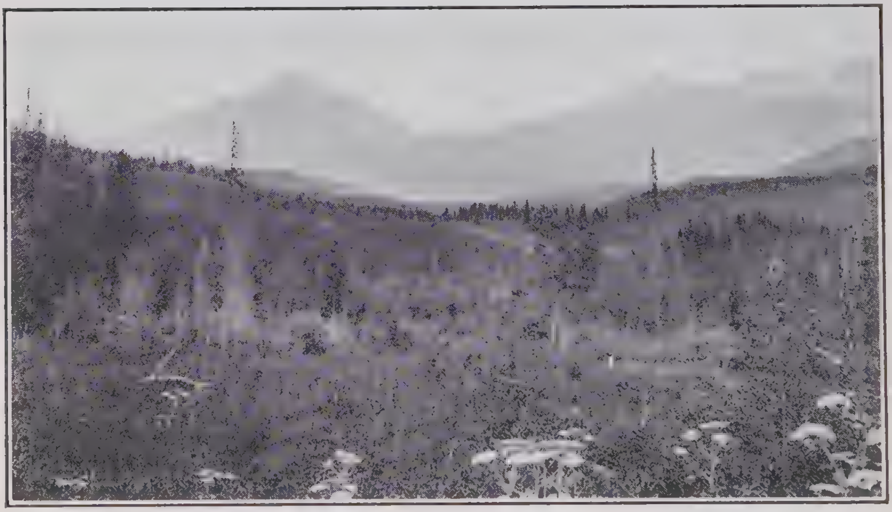

FIG. 3—View of Mount Geikie from the hillside showing the Athabaska and the peaks alongside forming Simpson Pass.

The Athabaska describes a sharp bend to the southeast near the foot of Mount Geikie, and at this point is fed by the Miette River, which comes in from the north, through a narrow defile. An abrupt change in the character of the vegetation was observed to the west of this river. The small jack-pine gave way to the towering bastard Douglas fir, while the flora became distinctly British Columbian in character and variety. In a few minutes we stood in the Yellowhead Pass, which is a gap in the Rocky Mountains 1,000 feet or so in width, at an altitude of 3,720 feet. The Great Divide at this point is so slight that the Miette River, which normally flows southwards to join the Athabaska, in times of flood sends its surplus waters to form a small creek that empties into Yellowhead Lake, so that, seasonally, the river flows both westward and eastward.

The descent from the Pass is gradual through a burnt country with a wealth of wild grass and dense bush. Soon we caught sight of Yellowhead Lake and from the trail around its north shore we had a fine view of Mount Pelée, rising sentinel-like from the wealth of trees on the opposite bank. The lake is an irregular sheet of water and its outlet is a small creek forming one arm of the Fraser River, which, in a mile or so, joins the first arm of that waterway, foaming down the mountain slope on which it takes its rise.

The country along the upper reaches of the Fraser river is scenically grand. The trail and also the Grand Trunk Pacific Ry. follow the northern bank, keeping somewhat towards the foot of the mountains, inasmuch as the land immediately fringing the waterway is marshy, forming a chain of muskegs which are dangerous and difficult to cross and are concealed under a heavy growth of marsh grass. The mountains rise steeply from the southern bank and are clad from water to snow line in timber through which creeks and waterfalls cascade into the Fraser. Numerous creeks rush down the northern slopes into the waterway and at places are treacherous to cross.

The country is extremely diversified. At places the mountains press so closely together as to form merely a gulch, while at other points they roll back leaving wide, long stretches of meadowland, somewhat sodden with water. These verdant alcoves among the mountains are good situations for truck farming, and dairying should prove profitable when town and scenic centers are developed at good points for mountain climbing or for viewing the wonderful scenery. Many of these meadows are quite open and only require slight draining to bring them into productivity. They are saucer-like depressions with the river bank forming the rim. They may easily and cheaply be pierced at intervals to drain off the surplus water, leaving a rich loam of great depth, with which is mingled a vast quantity of natural fertilizer in the form of decayed vegetable matter and mosses.

This district, however, will depend essentially for its prosperity upon its scenic attractions. It is the lake land and mountaineering country of Canada. So far as the waterscapes are concerned, there are the Yellowhead, Moose, and Helena Lakes, all of which are of great length and depth, suited for gasoline launches, while the waters on all sides are hemmed in by lofty mountains, the majority unnamed and constituting virgin ground for the Alpine climber. Foremost among the peaks is Mount Robson, the highest point in the Canadian Rockies, the massive ice-cap of which is at an altitude of 13,700 feet. In the neighborhood are innumerable other lofty peaks rising upwards of 11,000 feet. From the sporting point of view there are endless possibilities. The forests around the base of Mt. Robson teem with bear, especially grizzlies, while the Fraser River, the numerous creeks and lakes abound with fish. One lake we found to be alive with rainbow trout, thirty of which we hooked, in half an hour, with rod and line, scaling up to 15 ounces; and from the Fraser we obained large quantities of trout and Dolly Varden trout.

Between Yellowhead Lake and Mt. Robson the Fraser River is unnavigable even by canoes, for it abounds with rapids, falls, whirlpools and small cañons. At places it is barely 30 feet in width, while at others it widens out to a width of one or one and a half miles. After leaving Mount Robson it becomes wider as, in rapid succession, it is swelled by the South Fork emptying from Lake Helena, Swift Current, and other less imposing creeks. Consequently by the time Tête Jaune Cache is gained it has attained a width of about 350 feet, and hurries along at about seven miles an hour.

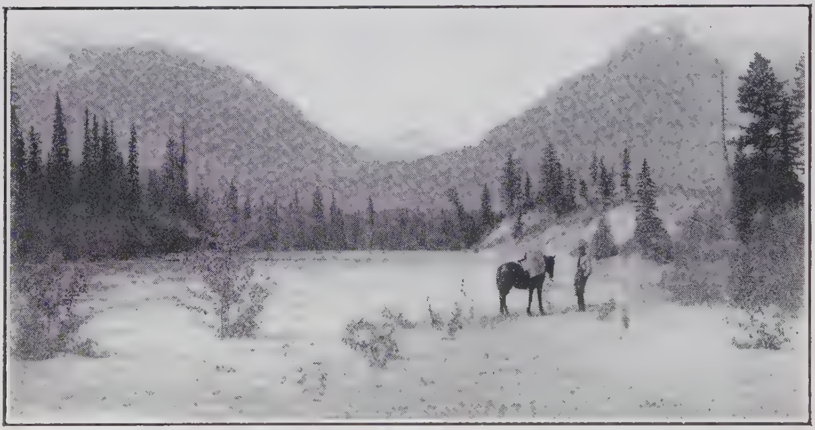

FIG. 4—Tête Jaune Cache. Fraser River in foreground. Mica Mountains behind.

The descent from Mt. Robson to Tête Jaune Cache, some eighteen miles, is somewhat sudden and the configuration of the country is such that the engineers of the railroad found it impossible to adhere to the prescribed grade of 21 feet per mile, so a pusher section had to be introduced to overcome this difficulty. At Yellowhead Pass, the summit of the railroad between the Atlantic and the Pacific seaboards, the track reaches an altitude of 3,720 feet, but in the course of the next fifty miles it drops 1,200 feet, Tète Jaune Cache being at an altitude of 2,524 feet.

At this point, the Rocky Mountains come to an abrupt termination along the river banks and the country opens into a valley about twenty square miles in area. Geographically this is a very interesting point in British Columbia, for standing upon the ridge on the north side of the Fraser River, one looks down not only upon that waterway but also sees the Glennan River, furthermore, the upper part of the Thompson River and the headwaters of the Canoe River, which flows almost due south to join the Columbia.

Tête Jaune Cache is the head of navigation for small draft steamers upon the upper Fraser, there being a clear, good waterway from this point for 470 miles west to Soda Creek. It is also the highest point which the salmon gain when on the run, for the bars and sandbanks in the waterway in the vicinity of the Cache constitute their spawning grounds. Further progress up the river is barred by a fall about 30 feet in height which is naturally beyond the leaping capacity of the fish after their exhausting long run up the river. Large numbers of the fish are caught by the Shuswap Indians living in the vicinity, trappers, and others, the general method of capture being by spearing at night with the aid of a lantern.

At this point, owing to the trail coming to an end, Siwash dugouts were taken in order to reach Fort George; but before embarking upon the second part of the journey, opportunities were given to investigate the arable possibilities of the land in the region of Tête Jaune Cache.. A gold prospector had squatted upon a quarter section and had brought a small patch under cultivation, raising lettuce, onions, and other vegetables. The soil is light, sandy loam, easy to work, and eminently adapted for vegetables. The mountain slopes rise in regular benches, and as the whole country has been burned off by forest fires, the preliminary operations are light. The mineral resources are confined at this point to mica, one mountain being named after this material owing to the illimitable quantities of this mineral. The soil indeed for some distance around is heavily impregnated with pulverized mica schist. I was told the mineral was mined fairly easily and that sheets up to twenty-four inches square of white mica had already been obtained. A nickel ore had been found also in small quantities and some excellent specimens of gold ore had been obtained in the neighboring mountains.

Once afloat on the Fraser River we were soon impressed with the velocity of its current and could realize why its discoverer, after whom it is named, christened it the "Bad River," for it demands skilful navigation in an Indian dug-out. Timber jams of huge proportions constitute one of the greatest dangers. Some of the collections of large timber along the shores were over two miles in length. For the first twenty miles the mountains crowd upon the southern bank, a mass of peaks. On the north bank the configuration is somewhat easier, the land sloping up gradually from the water's edge.

The valley through which the Fraser flows is of great width, judging from the distance between the opposing rows of peaks, while the waterway winds from side to side. Its course is roughly northwest for nearly 300 miles and a third of this distance is represented by twists and bends. The railroad, although laid along its bank, at the same time cuts across the chord of the horseshoe bends, so that, though by water the distance from Tête Jaune Cache to Fort George is about 320 miles, by rail, it will be only 210 miles. Some of the loops formed by the river are no less than ten miles around, while by striking across country at the neck of the loop less than half a mile of portage is required.

This part of British Columbia is probably the least known, but it is one destined to occupy a prominent position in the near future. It can only be described as "Nature's Garden," inasmuch as the soil is suited to the production of any root crops, and even bush fruits. The climate is ideal. In summer the thermometer hovers around 80°, but welcome showers temper the heat and bring moisture to the vegetation. The topsoil is an accumulation of decayed vegetable matter up to 24 inches in depth, with an alluvial loam beneath. The possibilities of the soil were shown by the prolific growth of bracken, which grows to a height of five feet with stalks resembling sugar canes.

The timber wealth of this country is illimitable. The lower-lying portions are covered with dense forests of pine in which the Douglas fir predominates, with hemlock, balsam, birch, and, back of the river, are immense groves of cedar, their trunks often having a girth up to thirty feet. For the most part, fire has wrought little damage in these timber reserves, though here and there are bleak stretches of black country, desolated by fire. The timber stretches as far as the eye can reach from the river to the snow lines on the distant mountains. On the lower lying hills the trees have a peculiar emerald green hue, due to the frequent rains. The country,

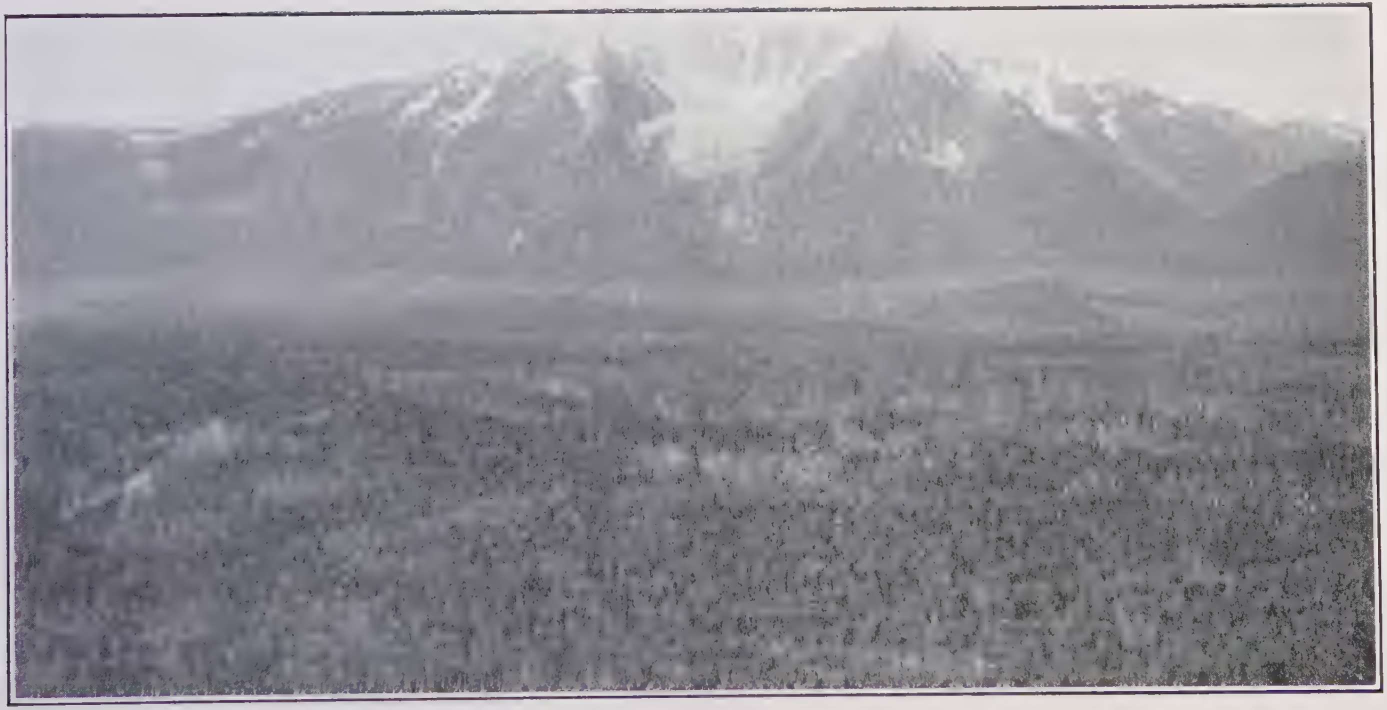

FIG. 5 Hudson Bay Mountain and its noble glacier from five miles distant.

however, is impenetrable for more than a few feet from the water's edge, owing to the density of the forest. This is not surprising, as the country is in its primeval condition. The only way of penetrating the regions back of the river is along the numerous waterways which flow into the Fraser on either side, such as the Shuswap, Beaver, Smoky, Goat, Bear, Willow, and Salmon Rivers and the North Fork of the Fraser, the junction of the latter being about 80 miles north of Fort George.

The country is rich in game of all descriptions, bear being exceptionally plentiful. There are promising strikes of gold on the Rau Shuswap and the Beaver Mountains overlooking the river of the same name. The extent of alluvial gold in the lower reaches of the Fraser has pointed conclusively to the fact that in the higher reaches large deposits of this mineral must exist, but the difficulties and dangers of following up the river have been unfavorable to prospecting upon a methodical scale. The find on the Beaver River is reported to be the best discovery up to the present, and that the deposits must be somewhere in the neighborhood of these mountains is proved by the fact that the Fraser reveals only very slight traces of alluvial gold east of this point. All the creeks and rivulets, however, upon being tested with the pan showed colors.

The railroad leaves the Fraser River at Fort George, which is at the southern edge of the great interior plateau forming New British Columbia, crossing this waterway to pick up the southern bank of the Nechaco River which joins the Fraser at this point, the meeting of the waters constituting a lake. Fort George lies at an altitude of 1,880 feet, and in the course of the next 150 miles the railway makes a gradual climb, running almost due west to Fraser Lake, and then bears towards the north to gain the Skeena River. The Nechaco River follows a somewhat winding course, draining a large tract of low-lying country which was formerly a lake bed, and of which inland sea the Français, Stuart, Fraser and other lakes remain. The Nechaco is the outlet of the Fraser and Français Lakes, while its tributary, the Stuart, drains Stuart Lake. Owing to these lakes being the headwaters of the river, its volume does not vary appreciably, for the lakes act as balancers. The railroad follows the course of the Nechaco, thus traversing the lower lying parts of the country. The soil being alluvium associated with a thick layer of decayed vegetable matter, is extremely fertile, while the subsoil being clay keeps moisture within reach of vegetation. The topsoil varies from two to eight feet in depth. Convincing evidence of the fertility of this soil is supplied by the growth of vetches and wild grasses. Wild timothy tops five feet in height, and averages between three and five tons per acre, while the sugar-cane grass grows to six or seven feet and is rivaled only by the prolific growth of the pea vine. The country has been burned over for the most part, and the second growth of timber comprises merely young cottonwood and willow, which can be cleared easily.

The recurrence of these stretches of meadow constitutes one of the most notable features of the country, and although the altitude is about 2,000 feet, it is considered to be no handicap to any class of agricultural production. Truck gardening, dairying, and cattle raising offer the greatest chances of success. On the whole, the land is too rough to admit of grain raising upon a sufficiently extensive scale to enable machinery to be used, while it is doubtful if the uplands would be suited to grain even if it were practicable. These stretches, on the other hand, as well as the steeper slopes covered with cottonwood, are well suited to cattle raising, inasmuch as the prolific growth of fodder among the trees assures ample sustenance for animals. The equable climate is conducive to this end. The winter is mild and in many places it is possible to keep stock out of doors the year around. This result is due to the full benefit which this region derives from the chinook wind, as the country lies in its path and its influence is felt as far away as the Peace River country. Pioneer settlers who have had some years of experience say the country is of no use to any but experienced farmers carrying on mixed farming. The most successful settlers I met were either British, or Eastern Canadian farmers, and Chinese, the latter being exceptionally successful in truck gardening.

Fort Fraser will probably develop into an important point. At the time of my visit it contained only the Hudson Bay Trading Post, the operator of the Yukon telegraph line, and an Indian village. The Indians are numerous throughout the country, having established large villages, the most important of which are at Fort George, Stoney Creek, and Fort Fraser. They are coast Indians of the Siwash tribe, and, on the whole, are lazy and thriftless. They own the cream of the country and, as their lands comprise the most extensive open areas where grasses grow luxuriantly, the work of tending their stock is reduced to a minimum. In their patches of garden, potatoes looked sickly, but this was due entirely to poor methods and poor seed. At Fort Fraser they were trapping salmon which had made their way up from the Pacific to spawn in the Fraser and Français Lakes. The fish were in fine condition considering their long and exhausting journey, but the yield was small.

The Indians gain a bumper harvest of fish only once in three years, a mystery that is still unsolved.

During the next few years a fleet of shallow-draft steamboats are to be launched on the Upper Fraser River, with headquarters at Fort George and Soda Creek, 150 miles south. As this region has over 1,000 miles of navigable waterways, the waterborne traffic will have considerable importance. On the Fraser there is a clear run of 470 miles between Soda Creek and Tête Jaune Cache, with Fort George as the center, while these vessels can steam up the Nechaco

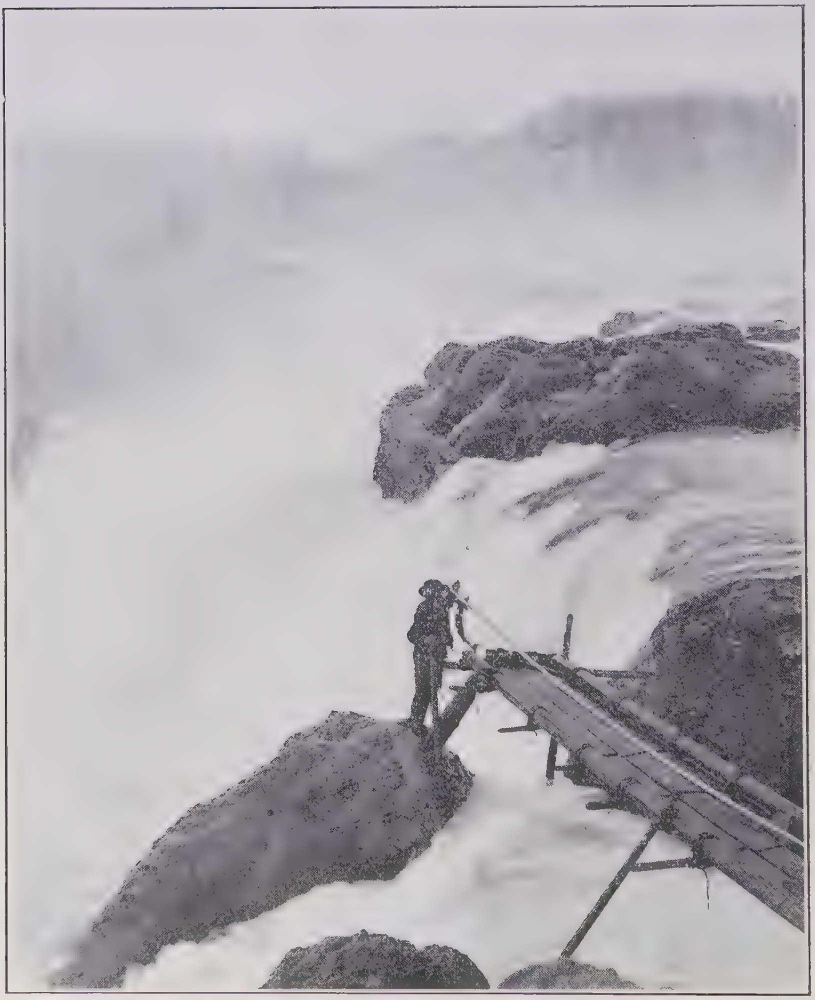

FIG. 6—Salmon fishing on the Bulkley River, Moricetown, B. C.

and Stuart Rivers, into Stuart Lake, and thus keep in touch with the Hudson Bay Post of Fort St. James, or ascend the Nechaco River to Fraser Lake. It is even expected that the smaller craft will be able to make their way into Français Lake, navigating that 70-mile stretch of water from end to end. This will open up the fertile grazing and arable areas of the country surrounding the Français and Ootsabunkut Lakes.

The railroad follows the course of the Endako River (which empties into Fraser Lake), to Burns Lake and then past Decker Lake to pick up the headwaters of the Bulkley River. There is a gradual climb, as the low ridge known as the Bulkley summit has to be overcome, the grade reaching an altitude of 2,366 feet, approximately that of the summit level on the prairie division between Wolf Creek and Winnipeg. Much of the land to the north of the line through this country is not suitable for any branch of agriculture excepting stock raising, as the country is too rough for farm machinery and the hills lead up to the Babine Range. Here and there are promising open spaces, many of which have already been taken up, and excellent results are being achieved.

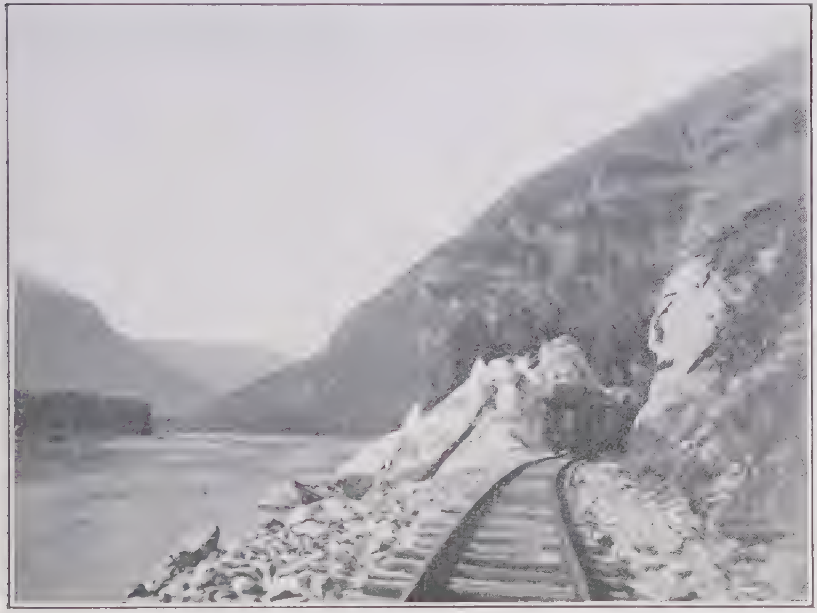

FIG. 7—On the Skeena River, B. C.

But the land which has proved the greatest agricultural surprise is the Bulkley Valley. This depression is low. The railroad descends from the summit to the waterway, this descent continuing in fact for the next 120 miles until the Skeena River is gained. This valley, like the two preceding valleys, is an old lake bed, with a very thick deposit of alluvium. At the Pioneer Ranch the soil, over an area of 1,000 acres which has been cleared, ranges up to thirty-two feet in depth. Produce grows with exceptional luxuriance, turnips being pulled which measure 36 inches in circumference and weigh 15 pounds; cabbages resembling large bushes; carrots 24 inches in length; parsnips measuring six inches across the crown; and so on. The timothy averages between five and six tons per acre, while the wild timothy, which grew to a height of nine feet, ran about five tons per acre. The oats topped five feet, and though the ranch is surrounded by dense forest, no ill effects appear to be suffered from summer frosts, although the grain was in the milk. The soil was free and worked easily, there being no signs of outcrop of gravel or rock. The cattle were in prime condition, yielding rich milk and fine beef. Wild gooseberries, currants, and strawberries were being cultivated with much success, as the berries were twice the size and of better flavor than those we plucked in the wild state. These conditions prevail throughout the valley and the settlers with whom I conversed expressed complete satisfaction with their situation and fortune.

The Bulkley Valley is limited in area, as the Babine and Coast Ranges run diagonally towards one another and meet at the northern end of the depression. While the Babines protect the valley against the north and east winds, the rifts in the Coast Range permit the free passage of the chinook winds, which accounts for the fact that the snowfall rarely exceeds twenty inches. Indeed, a lesser depth usually prevails, and the melting influence of the warm winds serves to keep the soil mellow and moist. In the summer, when the thermometer ranges between 80° and 90°, warm rains from the west keep the crops in prime condition, affording them refreshment just at the time when they require it.

In this country mining and agriculture will rival one another, for the mountains are rich in minerals. The Babines have yielded excellent strikes of galena and lead, while copper ranging from a low grade ore of 2 per cent. to almost virgin metal of 90 per cent. have been found. Gold is in small quantities, but lead and copper predominate. On the western side of the valley in the Coast Range a rich deposit of coal has been found extending over 25,000 acres. Other strikes of coal have been found throughout this territory, and the abundant supplies of this fuel are of good augury for the mining industry.

To emerge from this valley the railroad tunnels through a shoulder of the mountains, this being the longest tunnel on the whole line—about 3,000 feet. Leaving the mountains the Skeena River is gained at Hazelton, the head of navigation on that waterway and a Hudson Bay post. The line follows the course of the Skeena to the seaboard. In passing to the coast the railroad crosses a region where experiments in fruit culture have proven very promising and it is possible that the Skeena River country will rival the famous Okanagan and Kootenay valleys in southern British Columbia.

The terminus of the road is at Prince Rupert, a natural landlocked bay having an entrance from the broad Pacific a mile in width, with a harbor 11 miles in length.

My own conclusions from an examination of the country is that the center of industrial, commercial, and agricultural activity will move for the most part from southern British Columbia to the north, where the soil is richer, the climatic and physical conditions more attractive, where the winters are mild, and where there is every inducement to develop diversified farming upon an extensive scale. The mineral wealth is great, and the mining regions have the advantage of being in close proximity to farming lands, thus cheapening food supplies.

THE FORCE OF GRAVITY AND METHODS OF MEASURING IT

BY

C. H. SWICK
Coast and Geodetic Survey, Washington, D.C.

In 1665, while watching an apple fall from a tree in his garden, Sir Isaac Newton had the first conception of his great discovery, the law of universal gravitation. He soon after advanced the theory that the attraction between any two bodies in the universe is directly proportional to their masses and inversely proportional to the square of the distance between them, and he afterward proved this theory by computing the attraction between the earth and the moon.

The variation of the force of gravity at different places on the earth was first discovered by Richer in 1672. He transported a clock pendulum from Paris, France, to Cayenne, South America, and not only found the force of gravity to be different at the two places but also found a progressive increase in its intensity from the equator toward the poles. Using this fact as an experimental basis, Newton demonstrated the earth to be not a true sphere but more nearly an oblate spheroid, it being considerably flattened at the poles. It was not until 1743, however, that formulæ were derived, by Clairault, for computing the true form of the earth from observed values of gravity in different latitudes. The need and importance of gravity observations were then realized for the first time.

Early in the Nineteenth Century experiments were begun separately by France and England to determine the exact form of the earth from gravity observations. The force of gravity was determined at several stations along the meridian in France and at other stations in Great Britain. The attempt to compute the form of the earth from these determinations, however, was a failure, for gravity was found not to vary directly with the latitude, as had been supposed, but to have other variations due to the elevation of the station and to the topography surrounding it. To overcome these difficulties it was then decided to extend the series of stations to the equator on the one side and to the highest accessible latitudes of the northern hemisphere on the other, the stations being so selected as to eliminate as far as possible the effects of elevation and topography. These additional stations were occupied by Sabine in 1822. The results were more satisfactory this time and when computed gave fairly consistent values for the form of the earth.

Many gravity stations have been occupied since that time in nearly all parts of the world, and for several reasons these determinations have been important and necessary. Gravity observations give means for obtaining accurate, absolute standards of length and weight, and many useful inferences can be drawn from them regarding the geologic constitution and the condition of equilibrium of the earth's crust. As more stations are occupied, more accurate values of the form of the earth can be computed, and much can be learned regarding the effect of mountain masses in deflecting the plumb line.

Richer's discovery of the difference in gravity between Paris and Cayenne was made accidentally in transporting a clock from one place to the other. His clock, which kept accurate time at Paris, continually lost two seconds daily at Cayenne. In the experiments which followed Richer's discovery the pendulum was found to be not only the most convenient but also the most accurate method of determining the force of gravity, and it has been used since, almost exclusively, for such determinations.

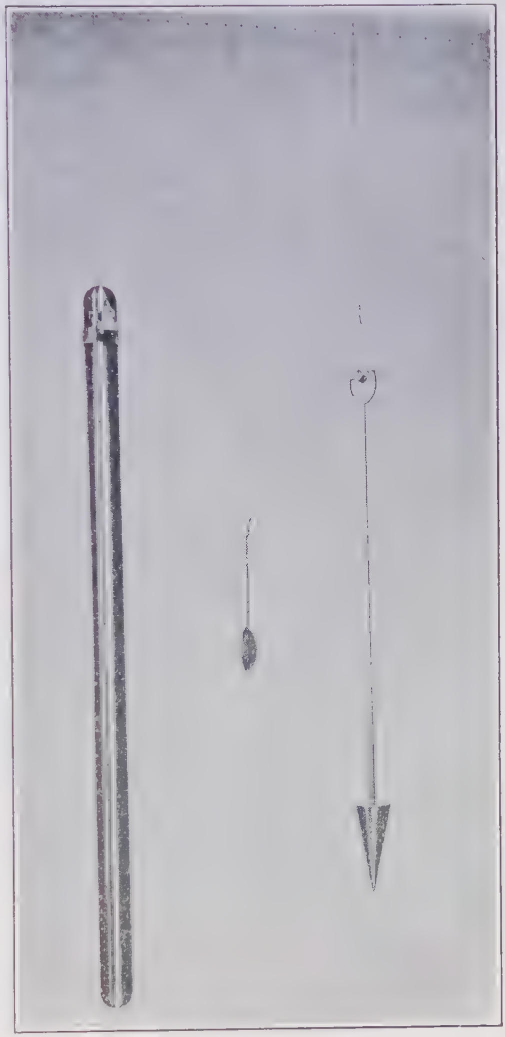

Fig. 1—Two old forms of meter pendulums compared with the quarter-meter pendulum in present use. The one at the left is known as the Pierce Invariable pendulum, the one at the right as the Kater Invariable pendulum, and the one at the center is the quarter-meter pendulum.

At first, the pendulums used were rather crude, and were kept in motion by clockwork. As soon as it was realized, however, that the results must be very accurate to be of value, improved forms of the pendulum were developed whose lengths could be made very stable. These were swung in the open air and were detached, that is, were not connected with machinery of any sort to maintain their motion or register their oscillations. The effective length of these pendulums was made approximately one meter and the period of oscillation was about one second. Some were made adjustable and could be regulated in length to beat seconds at any station. These were reversible, that is, they could be swung with either end up, and their effective lengths at any given station were readily measured, being the distance between the two points of suspension after the pendulums had been adjusted to beat seconds with either end up. Other forms were made rigid and non-adjustable and the force of gravity at any station was obtained by measuring their periods of oscillation at that station and comparing these with their known periods at some base station where gravity had been determined absolutely with the reversible pendulum.

All of these early forms of the pendulum were large, over a meter long, and were difficult to handle and use. Considerable preparation was necessary at each station before they could be swung and the cost per station was very high as compared to the cost with present-day instruments and methods.

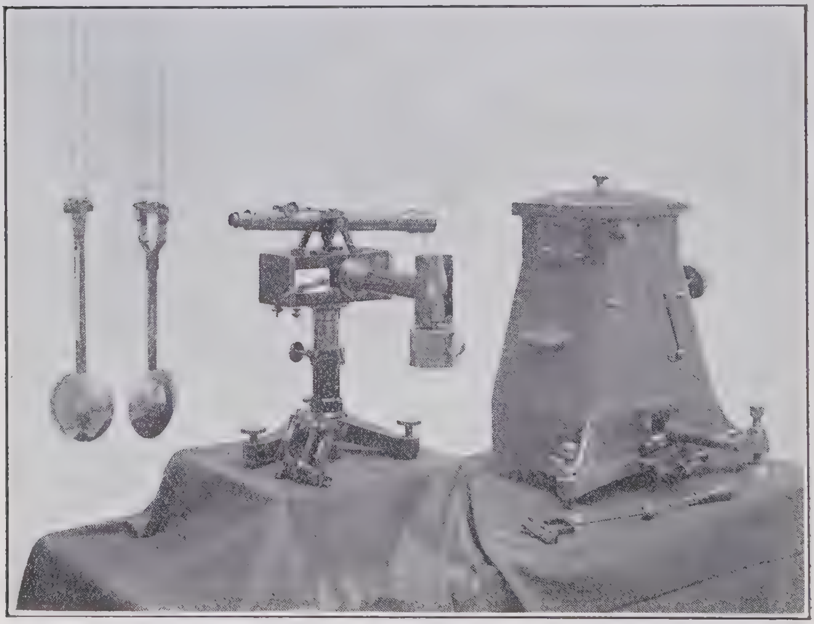

FIG. 2—Gravity apparatus of the Coast and Geodetic Survey in use at the present time. At the left are shown two quarter-meter pendulums, one of which is a stationary "dummy" containing a thermometer. The telescope used for observing the oscillations of the pendulum is shown at the center and at the right is the air-tight brass case in which the pendulums are swung.

The form of pendulum now used by the Coast and Geodetic Survey differs very materially from the early forms and was designed and constructed by members of the Survey about 20 years ago. Like the pendulum designed by Dr. R. von Sterneck in Austria several years previous to this time, it is only one-quarter of a meter long, having been designed for a period of oscillation of about one-half second. The decrease in length of pendulum made a great difference in the size and weight of the accompanying apparatus and decreased very considerably the necessary preparation at a station.

Another step in advance made at this time was in substituting a chronometer for the sidereal clock which had been previously used in obtaining the period of oscillation of the pendulum. In spite of these changes, however, the necessary equipment or apparatus for measuring gravity at a station, when packed for shipment, still weighs more than half a ton, and the packing and transporting of it requires much work and great care.

The gravity outfit in present use in the Survey consists of the following essential parts: Three pendulums, an air-tight brass case in which the pendulums are swung, a telescope for observing the oscillation of the pendulums, two chronometers, an astronomical transit, a chronograph, several thermometers, a manometer, and an interferometer, an instrument for measuring the movement of the case caused by the swinging pendulum.

The method of procedure at a station is as follows: The corrections of the chronometers to the nearest hundredth of a second are first obtained by star observations with the transit; then the pendulums are started and observed every 4 hours for 48 hours, each one of the three pendulums being used for 16 hours. At the end of the swinging, another set of star observations is made by which a second correction of the chronometers is obtained and the rates of the chronometers are then computed. The observed periods of oscillation of the pendulums are corrected for this rate of the chronometers to give their true periods of oscillation.

The pendulum is a simple stem and bob of solid brass, cast in one piece, and differs from an ordinary clock pendulum, in having a small agate plane attached to its head, which rests on an agate knife edge in the case, and in not being connected with any machinery to drive it or count its oscillations. The case in which the pendulums are swung has the air exhausted from it during the experiment to less than one-tenth of atmospheric pressure. The resistance of the rarified air and the friction between the knife edge and plane are so small that a pendulum will swing continuously for more than 8 hours even though its initial arc is only about one-fifth of an inch.

The oscillation of the pendulum is observed and compared with the beat of the chronometers at the beginning, middle and end of each 8-hour swing, and from these comparisons the average period of oscillation of the pendulum is computed.

The resulting value of gravity at a station, to be acceptable, must not have a probable error of more than one part in 200000. An actual error of one part in 200000 corresponds to an error of only one one-millionth of a second in the period of oscillation of the pendulum. Such accuracy is almost inconceivable, but it is attained with very little difficulty if the observer is accurate and careful. Care is taken to keep the pendulum apparatus at as nearly a constant temperature as is possible and any changes of temperature are carefully observed.

One of the corrections which must be applied to the observed time of oscillation of the pendulum is due to the movement of the case resulting from the swinging of the pendulum. The case is a rectangular brass box about 10 inches square at the base and 15 inches high (inside dimensions), weighing 100 lbs. It is either placed on a solid concrete floor or a special brick or concrete pier is built for it. In spite of these precautions, the swinging of the pendulum through its very small arc causes a rocking of the case, and this in turn effects the period of the pendulum. This small movement of the case is measured by the interferometer, a very delicate instrument which depends in principle upon the interference of light waves. With it distances as small as one ten-millionth of an inch can be measured. Vibrations of the ground due to the passing of a team a city block away or a train a mile away are easily detected, and, in fact, they so disturb the instrument that observations are usually possible only at night, when everything is quiet. The shaking of the ground due

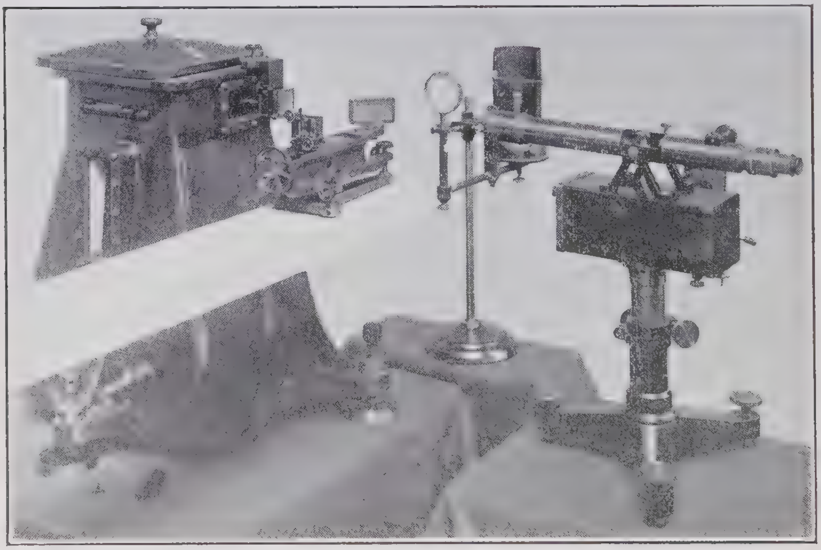

FIG. 3—Interferometer apparatus arranged for observing the movement of the case due to the swinging pendulum. The interferometer is shown resting on the end of the wooden beam at the center of the picture.

to the passing of teams and other disturbing causes, while it has considerable effect on the interferometer, does not have an appreciable effect on the average period of oscillation of the pendulums. The movement of the case due to the oscillation of the pendulum, however, always has a negative effect on the period, that is, it causes the pendulum to beat a trifle slower than if the case were perfectly rigid.

There are 124 stations in the United States at which the force of gravity has been determined. About two-thirds of these have been occupied during the last three years. All determinations are made by the relative method, that is, the force of gravity at a station is obtained by measuring the periods of oscillation of the pendulums and comparing these with the known periods of the pendulums at the base station in Washington, D. C. The value of gravity at Washington was obtained in a similar manner several years ago by using Potsdam, Germany, as the base station where the force of gravity was known from absolute determinations covering many years.

A gravity party consists of two observers. A week or ten days is the usual time spent at a station, but in case of bad weather two weeks or even longer are sometimes necessary for the work. As all the observed values in the field depend upon the periods of the pendulums at the base station, the pendulums are brought back to Washington at least twice a year and tested to see that their periods have not changed or, if they have, to ascertain the amount of the change.

An interesting report on a new method of computing the effect of topography upon the intensity of gravity at a station has been prepared by the Coast and Geodetic Survey, and it will be available for distribution in the very near future.

THE CROCKER LAND EXPEDITION

About July 20 this year Mr. George Borup, Assistant Curator of Geology in the American Museum of Natural History, and Mr. Donald B. MacMillan expect to leave Sidney, Cape Breton, on a special steamer for the Smith Sound region to engage for two years in Arctic researches of great interest. The American Museum of Natural History and the American Geographical Society have approved the plans of these men and will give their support to the enterprise. Yale University and other institutions and individuals will also cooperate. The objects of the expedition are to reach and map Crocker Land, in the North Polar Sea, northwest of Grant Land, and to make all the scientific studies *en route* and in other parts of the Arctic regions that circumstances may permit.

The explorer Peary on June 30, 1906, stood on the summit of Cape Thomas Hubbard, the most northern point of Axel Heiberg Land, and what he saw he thus records in his book "Nearest the Pole":

"The clear day greatly favored my work in taking a round of angles and with the glasses I could make out, apparently a little more distinctly, the snow-clad summits of the distant land in the northwest above the ice horizon."

This appearance of land had been observed a few days before by Peary and his Eskimos from the northern shore of Grant Land and particularly from the top of Cape Colgate, 2,000 feet above sea level. Peary thought it was at about 100° W. Long. and 83° N. Lat., or about 130 miles from Cape Thomas Hubbard. Peary gave it the name of Crocker Land, in honor of the late Mr. George Crocker, of the Peary Arctic Club.

Dr. R. A. Harris, the well-known tidal expert, of the U. S. Coast and Geodetic Survey, based on a plot of all known tidal observations ("Arctic Tides, 1911") the deduction that a great area of land or an archipelago, or very shallow water, trapezoidal in outline and half a million square miles in superficies, exists north of western America and eastern Siberia, and stated his belief that the Crocker Land observed by Peary was part of its eastern edge.

In the Polar regions, however, great ice masses have sometimes been mistaken for land. It remains for the Crocker Land Expedition to show whether this land really exists. But there are questions of even greater importance than this to the solution of which the explorers will give much attention.

Dr. Nansen, in an article on "North Polar Problems" (1907), said: "The determination of the extent of the continental shelf to the north of Axel Heiberg Land and Ellesmere Land would be a great achievement. . . A satisfactory solution of this problem would be of more scientific value than even the attainment of the Pole. . . The extent and shape of the polar continental shelf, which means the real continental mass, is the great feature of north polar geography which is of much more importance, geographically or geomorphologically, than the possible occurrence of unknown islands on this shelf."

The expedition will take soundings to and from Crocker Land

and will endeavor to ascertain the position of the continental shelf in that region.

The leaders will take with them a competent physician, a cook, and probably one other man. Both Borup and MacMillan are very well known to the public through the work they did under Peary in his last Polar expedition; and they have the Admiral's unqualified endorsement of the work they are about to undertake.

The accompanying map* shows Bache Peninsula on whose southern shore (Flagler Bay) it is proposed to erect in August, 1912, the headquarters of the expedition. On the way north whale and walrus meat, and dogs will be collected. Here is a brief outline of the further movements of the party:

After sending the ship home the party, about the middle of September, will begin sledging supplies to Cape Thomas Hubbard, carrying the work on through the winter during the moonlight periods. Leaving Cape Thomas Hubbard with the return of dawn in February, 1913, they will push across the ice to Crocker Land. They will leave Crocker Land about May 1, and return to Cape Thomas Hubbard, whence they will send a messenger to North Star Bay with the news of the expedition, to be forwarded home by Danish steamer. They will then carry on scientific work in Grant Land and along the return route to winter quarters on Flagler Bay, arriving there in July, 1913. During the summer, supplies and collections will be transferred to Etah. In the spring and summer of 1914, an expedition will be made from Whale Sound (Inglefield Gulf) directly eastward to the summit of the ice-cap of Greenland, at the widest part of that island. The party will return to New York in the autumn of 1914 by special ship.

The scientific studies proposed are comprehensive. From Flagler Bay to Cape Thomas Hubbard (some 330 miles through Ellesmere, Axel Heiberg and Grant Lands), continuous geological, paleontological and physiographic work will be done and specimens collected. From Cape Thomas Hubbard to Crocker Land, in addition to the soundings already mentioned, tidal observation, temperature observation at various depths in the water and collections of marine animals will be made. On Crocker Land, two months will be spent, mapping topographically and geologically the coast line and interior, and collecting specimens of rocks and fossils and of living plants and animals. A thorough study of glaciers, glacial ice-caps and glacial motion will be made, for the purpose of solving the problem of the process of land molding under a continuous, moving ice-cap, a process which is not yet understood. The "glacial fringe" off the north coast of Grant Land offers a particularly interesting field for study. Attention will be paid to meteorology, ethnology, archæology, birds, mammals and fishes.

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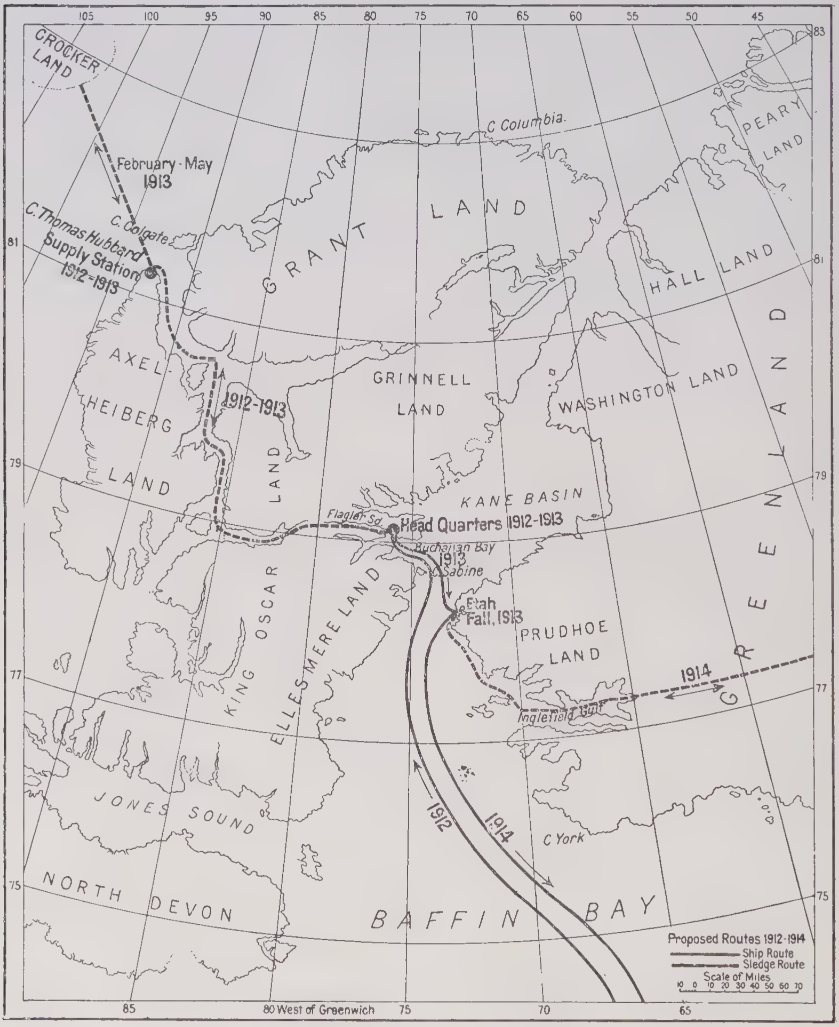
* Reproduced by the kindness of *The American Museum Journal.*



Map showing Proposed Route of the Crocker Land Expedition. Scale 1:8,500,000.

The following are some of the principal items of the outfit to be provided: three years' provisions for four or five white men, their helpers and their dogs, much of which, particularly the pemmican, has to be specially prepared and packed; clothing; instruments for all kinds of observations and records; photographic cameras, including those for moving pictures; a power boat for use in Flagler Bay and in crossing to Etah; salary of physician and wages of cook and helpers; a steamship to take the party to Flagler Bay in 1912 and another to go up for it in 1914.

It is estimated that not less than fifty thousand dollars* must be provided for the absolute needs of the expedition, in order to enable it to accomplish the valuable results that have been outlined above, and this in spite of the fact that Messrs. Borup and MacMillan generously serve the expedition without salary during the period of its absence from New York.

In addition to the appropriations made by the Museum and the Geographical Society, subscriptions have already been made or promised by Yale University, Bowdoin College, the New York Academy of Sciences, Worcester Academy and Groton School, and by the following individuals: General Thomas H. Hubbard, Admiral R. E. Peary, Mrs. C. B. Alexander, Zenas Crane, John E. Thayer, Theodore Roosevelt, Mrs. G. B. French, Harry E. Converse, Andrew G. Weeks, Richard S. Dow, Herbert Austen, Robert P. Simpson, John Larkin, E. W. Clark, L. H. Greenwood, J. Sanford Barnes, Jr., Paul B. Morgan, Samuel Rea, W. W. Atterbury and Lewis A. Platt.

The honorary committee on the Crocker Land expedition consists of Henry Fairfield Osborn, president of the American Museum of Natural History; Chandler Robbins, chairman of the Council of the American Geographical Society, and Thomas H. Hubbard, president of the Peary Arctic Club. The committee in charge comprises, E. O. Hovey, American Museum of Natural History, and H. L. Bridgman, Peary Arctic Club.

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* There remain to be raised about $30,000, and the Museum has opened an account, known as the "Crocker Land Expedition Fund," for the purpose of receiving and caring for all subscriptions made to the expedition. Checks to further its purpose should be drawn payable to the American Museum of Natural History and forwarded to E. O. Hovey of the Crocker Land Expedition Committee, to whom, furthermore, all correspondence relating to the expedition should be addressed.

MAPS AND MAP-MAKING*

BY

CYRUS C. ADAMS

Map-makng is very old, and has been practised by the most primitive peoples for many ages. Rude scratches on many rocks in South America are now interpreted as maps. East Greenland natives carve maps out of wood; American Indians make map-sketches on birch and other barks; the Marshall Islanders charted the sailing routes along their coasts long before they knew of the white man; the desert nomad sketches maps in the sand to illustrate his wanderings, and nearly every primitive tribe to-day makes maps to show routes to hunting-grounds, animal paths, fisheries, fords, etc. They know as well as we do that maps are practically a human necessity; but we know further that a good map often places before our eyes an amount of accurate geographical information that might take many months to dig out of books. We may cite a map of Africa, now over twenty years old, the largest of that continent produced up to 1890. Hermann Habenicht, the compiler, ransacked the literature of African exploration to find what each traveler wrote about the nature of the regions along his route; and the map showed these routes, and marked along them the forest, grassy, sandy, or tillable stretches, the water resources, native settlements, and much other information gleaned by pioneer explorers. The map was a time-saver for students, a fine epitome of some phases of the work done by many men over a long series of years. The leading geographers use the perfected map of to-day as much as they do books, and often more. Dr. Hermann Wagner, for example, has said that maps were his largest dependence in the production of his great *Lehrbuch der Geographie.*

But though map-making is very old, the kinds of maps most useful now have not very long been made. The atlases of a century ago did not contain a tithe of the information now expressed on atlas-sheets. Two generations ago the maps used in European schools gave little more than a few geographical outlines, such as coasts, political boundaries, rivers, and place names; sometimes a few scratches to represent mountains, but not always. It was only sixty-three years ago that Emil Sydow published in Germany the first edition of his school atlas, in which he introduced the revolutionary idea that school maps should tell children something more of geography than the positions of coasts, waters, towns, and boundaries. Maps should picture as well the mountains, valleys, and plains. Cartographic expression should be given to the land forms, and maps should help the teacher to show what the surface of the earth is really like.

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* This is part of a paper printed in *Harper's Magazine*, January, 1912. It is here reprinted by the courtesy of Harper & Brothers.

This fundamental idea has ever since been steadily developing. Map symbolism has wonderfully grown, till it is to-day fully adequate for the graphic expression of a large variety of facts; and, best of all, the European map-makers, by their use of contours of elevation, hachures, colors, and light and shade effects, have so perfected methods of showing the diverse forms of the earth's surface that even on a small-scale map of the Swiss Alps, for example, we may see before us the wonderful complex of high mountains, deep valleys, snow-fields, and glaciers. We may see the birth-place of the Rhine, whose glacial brooklets issue from an ice mass high up on the slopes; the little lake perched far above the valley in a small depression filled by the melting ice of the great Rhone glacier. These atlas-sheets are small, and nature is large; but the fine art of generalizing land forms has been so perfected by European cartographers that, though a great many details must be omitted, still the essentials of form are preserved, so that he who knows how to read maps may easily find the essential truth in the map picture.

The scientific map, so faithfully depicting the manifold aspects of the earth, has helped us to an interesting discovery. We know now that while the great object of geography is to describe the earth's surface, language alone is insufficient for this purpose. Only in the most general terms can speech draw a picture of the face of the earth. If we go into detail and try in words to give a complete description, the picture is vague and the mind cannot fully grasp it. The geographical description must always be associated with the map picture in order to impress upon the mind a clear and orderly idea of the various phases of the earth's surface.

Naturally, a fine map cannot give its greatest service to the man who does not know how to read it. Unfortunately map-reading is taught very little in our own schools; and the first-class map material that alone supplies the wide range of geographical facts, accurately and clearly expressed for the student's map study, is not often seen in our class-rooms. The result is that as a nation we are not skilful map-readers. Several years ago our government topographic survey completed eight sheets, embracing most of the Catskill Mountain region. Here was an opportunity to use these map-sheets of a bit of our country, embracing considerable variety of topographic form, to show how finely all this information might be generalized on a map-sheet of ordinary atlas size. It would be an object-lesson to our people, most of whom seldom see the mother-maps produced by our Government Survey. It would show the hundred thousand or more summer sojourners who annually visit the Catskills how much and how varied is the information that can be truthfully and clearly expressed on a small-scale atlas-sheet.

The American Geographical Society decided to have such a map made by one of the most famous map-houses of Germany. It was sold at cost price, just to demonstrate what beautiful and useful maps we shall have of our own country when we are able ourselves to apply the perfected methods of the cartographic art to the production of good, true, small-scale maps, generalized from the large-scale sheets that our government supplies. It is one of the finest maps of any part of our country. But it has made little impression upon the thousands who use Catskill maps, because so many are accustomed to look to a map only for guidance as to the position of towns and the routes leading to them. Here is a map not limited by such meager detail, but showing not only what the tourist first asks for, but also the hills, valleys, and level stretches in correct proportions and forms. A little careful attention shows approximately the grade of the roads and helps the consultant to figure out how far he can drive and get back to dinner. But though every feature of this beautiful map picture is sharply legible and full of meaning to him who can read a good map, it is to many persons overcrowded and bewildering. It gives them something of the impression that most of us have if we look at a page of Burmese print. How can such a jumble of funny-looking characters mean anything? We cannot read them, that's all.

If we Americans had been taught in school to appreciate and read the best maps, we should not be content with picture maps illustrating theaters of war, as, for example, the map of the strait in which Admiral Togo defeated the Russian fleet, with every war-ship, according to the map scale, at least fifty miles long.

The statement above, that the Catskill map is based upon sheets of our topographic survey, illustrates the two great classes of maps. Topographic surveys originated in Europe, and were meant especially to serve military purposes. It is very important in military operations to know the forms of the land, for as hostile armies approach each other each commander seeks to establish his forces in the most advantageous position for battle. So every important state in Europe organized topographic surveys, and methods were devised for surveying and establishing the elevation and forms of land surfaces. These methods, in time, were highly perfected, all governments use them to-day, and the resulting map-sheets give a close approximation to the actual forms of the earth's surface. We may thank this military impulse for serving so well the highest interests of geography, for these topographic sheets are now the basis of all our most accurate mapping. These detailed maps are, of course, on a large scale, and if well done they show as completely as possible the various features of the small area each includes.

It is different with the small or generalized maps such as the Catskill sheet, on which the great public chiefly depends. If they are maps of high quality they must be based upon the topographic-survey sheets as far as the territory they cover has been topographically mapped. It is interesting to note that while the basis of the generalized map is the topographic map, that of the topographic map is the ground itself. The greatest difficulties of scientific map-making lie in the generalization of these small or atlas sheets. When they show the whole world, or large parts of the earth, very little detail can be given; and in the making of all of these maps the decision of many questions, such as what to use and what to omit or how to generalize without sacrificing all characteristic essence, call for the highest qualities of scientific judgment and technical skill. This fine art of map generalization has been highly developed in most European countries, but as yet it has received little attention from our own map-makers.

Where no topographic surveys have been made the generalized map shows, in white, regions of which we have no knowledge. The delineation of partly known regions is controlled by critical use of all the available data. Accuracy in this case cannot be attained, but such knowledge as we have must be recorded; and it is even permissible to make some deductions as to the geographical features of the unknown if made by those whose theories are worth attention, and recorded on the map not as fact, but as tentative suggestion. Something of this sort has been done on the colored contour map of the United States published by our Geological Survey and showing various elevations of the surface. A large part of this great area has not yet been topographically surveyed, and many of the contours of elevation on the map are therefore tentative; but all considerations have been taken into account to fix the probable value of the contours, and very likely they are not far out of the way.

The effect of increased knowledge is usually to enlarge the scale of generalized maps. Twenty years ago all that was known of the geography of German East Africa might clearly be recorded on a small part of an average atlas-sheet. But hundreds of important geographical facts, such, for example, as the distribution of mineral locations, have since been discovered, with the result that no map of very small scale can now record the information at hand concerning this German colony.

Generalized maps of most European countries on a comparatively large scale are now common, and not a few of them are superb examples of map-making, in which scientific treatment of all geographical phenomena is combined with artistic presentation of the facts. Such maps are a source of great pleasure to the advanced student of geography. Thoroughly based on the principles of scientific cartography, they are works of art as well. One of the most conspicuous among them is Vogel's famous map of Germany in twenty-seven sheets. It cannot embrace all the detail of the topographic sheets, but every fact essential to most map-readers is there. Geographers always love to travel with a fine map in their hands, even when more or less familiar with the regions through which they are passing. The late Professor von Richthofen, of Berlin, said that he never made a railroad journey in Germany without Vogel's map before him. The Germans have devised a new railroad folder which is a delight to all who love to study good maps. It consists of sections of the Vogel map, showing the country for a considerable distance on both sides of all the important routes of travel in Germany. Crossing a little stream, you can see at a glance where it rises, to what larger stream it is tributary, and whether it is likely to be of industrial importance. Passing through the mountains, you can tell what lies beyond the range of vision from the car-window. This is a pastime and also a pleasant way of increasing one's geographical knowledge.

The use of color on maps has now been reduced by the best map-makers to a logical system. Not very long ago we saw on our own maps of the United States each State differentiated from those around it by a covering of color. A tint along the boundaries would have answered every purpose and left opportunity to use colors throughout the sheet as part of the scheme of symbols. Many map colors are now copied directly from nature, and often those selected are particularly appropriate, as, for example, the common use of blues for rainfall maps, the deepening blues of the sea as depths increase, the deepening buffs and browns as the heights of the land augment, the yellow tints for arid and sandy regions, and greens largely used on maps dealing with plant geography. The map-makers of the leading nations are approaching one another more and more nearly in their use of map colors; and for public convenience it is hoped that some day we shall see a uniform system of colors in all map symbolism. Such questions as these are sometimes settled by scientific bodies, as was the case when the Geological Congress at Bologna, in 1881, selected the colors to be applied to the International Geological Map of Europe.

A lesson we have yet to learn at home is that a good map cannot be made in a hurry. Most orders received by our map-making houses are accompanied by demands to hasten the work. The fact is that, even if a map is drawn with the utmost deliberation, errors will creep in. There is no such thing as a perfect map. A wrong stroke of the brush or pen, the slightest carelessness, may vitiate the delineation of the fact to be expressed. What possibility is there that a careful, truthful map may be produced when the demand from the map trade for high speed in performance is so pressing that craftsmen have actually been paid higher wages for manual dexterity than for competency to make a really good map? If many of our commercial map products are of low grade, it is due not only to poor technical and mechanical equipment, but also to the clamorous and incessant pressure of the man who wants the plates. The technical requirements of a good modern map are very great. In Germany a single map-sheet is often in course of preparation for many months. In the British Ordnance Survey the utmost that is expected of some of the workmen is the completion of a square inch of map-work in a day. None of the important map firms of Germany will accept a hurry order. The day is coming when our map-makers will not be compelled, at fever heat, to run a race against time.

The topographic survey-sheets of our Geological Survey and the charts of our Coast and Geodetic Survey are unexcelled by those of any other nation. In other words, we hold our own in the production of base or mother maps. But we fall short in the quality of our generalized or atlas maps. The making of such maps is the highest cartographic test, for they require the most talent and attainment. As the topographer makes his map-sketch in the field, he is producing nothing more than a reduced copy of the ground he is mapping. No imagination, no selection or discrimination is allowed.

He has the object before him, and with the appliances and methods provided he must produce faithfully the facts of nature. But the man who makes a generalized map relies not merely on objective facts, but he must eliminate all the lesser facts and interpret the others in such a manner that in outline and aspect they will be true to nature, though stripped of many of their characteristics. The faculty of doing this in a superior manner is inborn. Cultivation alone will not give it.

But we have not advanced so far in the art of map generalization as to have raised and trained a body of art-cartographers who possess this talent. We have not provided the facilities for training young men for this cartographic mission. The result is that nearly all of the European countries and even Japan are now producing better general atlases than are published in our country. It is not the fault of our few map houses that their products have not reached higher standards of excellence. Good maps cost more than poor ones; and as our system of geographical education has not, on the whole, familiarized students with high-grade maps, they lack appreciation, and there is little demand for them. In many European universities, students of geography are drilled both in the technical and the logical aspects of cartography; but our facilities are still inadequate for instruction in map logic and in the technical features of map production. Many of our maps are more pleasing in appearance than they were twenty years ago, but a map may be made more agreeable to the eye without adding to its scientific value; all our map students agree that in this greatest essential there is room for much improvement.

This situation will not last. Twenty-five years ago the standard of map-making in Great Britain was scarcely higher than it is in our country to-day. But in the course of years the influence of the geographical societies and of the universities in which chairs of Geography had been established brought about some public demand for better quality in maps; and this campaign of map criticism and of stimulation to raise the standard helped conspicuously to bring about a marked improvement in the map products of that kingdom.

An illustration may be given here of the fact that the demand for better maps is growing in our country. Two years ago one of our geographical societies formed a collection of many of the best wall maps and atlases used in several European countries. The collection has been loaned to about twenty universities, colleges, and normal schools, has traveled from the Atlantic to the Pacific, and has engagements for a year to come. The question of map improvement is becoming a live one; and we may expect that the one-millionth map of the world, in whose production all of the great map-making nations have a part, illustrating, as it will, the best phases of the cartographic art, will be potent in its influence upon our general map products.

THE SOCIETY'S TRANSCONTINENTAL EXCURSION

To celebrate the sixtieth anniversary of its founding, and the first of the occupation of the new building which has been presented to it, the American Geographical Society of New York has planned a Transcontinental Excursion which is to be managed and conducted by Professor William Morris Davis of Harvard University. The Excursion will start from New York about August 15 and will end at New York about October 15, 1912. The extreme points included in the proposed route are Seattle (and if possible San Francisco) on the Pacific coast, the Grand Canyon of the Colorado River in northern Arizona, and Chattanooga in eastern Tennessee. Many distinguished geographers of Europe, delegated by European geographical societies, will take part in the excursion, and the occasion will afford them abundant opportunity to observe interesting phases of the geography of our country. The route has been planned with the design to bring into view many aspects of the land, from physiography to economic geography. Various phases of geographical science will be represented by American members of the excursion, who will, as far as possible, act as guides for the European visitors.

The provisional list of the foreign delegates thus far received, and the geographical societies which they represent, are as follows:

AUSTRIA. *k. k. Geographische Gesellschaft, Vienna.* Dr. EDUARD BRÜCKNER, Professor of Geography at the University of Vienna; Dr. FRITZ MACHATSCHEK, Privatdozent of Geography at the University of Vienna; Dr. EUGEN OBERHUMMER, Professor of Geography at the University of Vienna.

BELGIUM. *Société Royale Belge de Géographie, Brussels.* GEORGES LECOINTE, Scientific Director at the Royal Belgian Observatory, Uccle.

DENMARK. *Kongelige Danske Geografiske Selskab, Copenhagen.* Professor OLE OLUFSEN, Secretary of the Royal Danish Geographical Society, Copenhagen.

FRANCE. *Société de Géographie, Paris.* Dr. GUILLAUME GRANDIDIER, Vice-President, Commission Centrale de la Société de Géographie, Paris; EMMANUEL DE MARGERIE, Vice-President, Section of Historical and Descriptive Geography of the Comité des Travaux Historiques et Scientifiques, Paris; ÉDOUARD-ALFRED MARTEL, late President, Commission Centrale de la Société de Géographie, Paris.

GERMANY. *Gesellschaft für Erdkunde, Berlin.* Dr. ERICH VON DRYGALSKI, Professor of Geography, University of Munich; Dr. JOSEPH PARTSCH, Geheimrat, Professor of Geography, University of Leipzig; Dr. ALBRECHT PENCK, Geheimrat, Professor of Geography, University of Berlin.

GREAT BRITAIN. *Royal Geographical Society, London.* HENRY O. BECKIT, School of Geography, University of Oxford; GEORGE G. CHISHOLM, Lecturer on Geography, University of Edinburgh. [A third delegate is to be appointed.]

HUNGARY. *Magyar Földrajzi Társaság (Hungarian Geographical Society), Budapest.* Dr. EUGENE DE CHOLNOKY, Professor of Geography at the University of Kolozsvár; Count PAUL TELEKI, Honorary Secretary-General of the Hungarian Geographical Society, Budapest.

ITALY. *Societá Geografica Italiana, Rome.* DR. OLINTO MARINELLI, Professor of Geography at the Institute of Higher Studies, Florence; Dr. DECIO VINCIGUERRA, Professor of Biology and Zoology, University of Rome.

THE NETHERLANDS. *Koninklijk Nederlandsch Aardrijkskundig Genootschap, Amsterdam.* J. F. NIERMEYER, Professor of Economic Geography, University of Utrecht; Dr. KARL OESTREICH, Professor of Physical Geography, University of Utrecht.

NORWAY. *Norske Geografiske Selskab, Christiania.* THOROLF VOGT, Geological Survey of Norway.

PORTUGAL. *Sociedade de Geographia, Lisbon.* Dr. FRANCISCO SILVA TELLES, Professor of Geography in the Faculty of Letters, University of Lisbon.

RUSSIA. *Imperatorskoye Russkoye Geograficheskoye Obshchestvo, St. Petersburg.* JULES M. SCHOKALSKY, Professor of Physical Geography at the Académie Navale Nicolas and at the École Supérieure Pédagogique, St. Petersburg.

SPAIN. *Real Sociedad Geográfica, Madrid.* Dr. RICARDO BELTRAN Y RÓZPIDE, Secretary-General of the Royal Geographical Society, Madrid.

SWEDEN. *Svenska Sällskapet för Antropologi och Geografi, Stockholm.* Dr. GUNNAR ANDERSSON, Professor of Economic Geography at the College of Commerce, University of Stockholm.

SWITZERLAND. *Geographische Gesellschaft, Bern.* JEAN BRUNHES, Professor of Geography at the Universities of Fribourg and Lausanne; ÉMILE CHAIX, Professor of Economic and Political Geography at the University of Geneva and at the School of Commerce; DR. FRITZ NUSSBAUM, Privatedozent of Geography at the University of Bern.

The meeting in New York at the close of the Excursion will occupy two days. Foreign members of the party will be invited to make brief communications on objects that have excited their interest, and to describe European parallels to American examples. Provision will be made for the subsequent publication of the papers thus submitted.

The *Bulletin* will print later the names of additional foreign members, together with a list of American members of the Excursion.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Congratulations to Amundsen. In behalf of the American Geographical Society this cablegram was sent to the explorer Amundsen, by President Huntington, after the announcement that he had attained the South Pole:

> "New York City, March 11, 1912.
>
> "Roald Amundsen, Hobart, Tasmania.
>
> "American Geographical Society congratulates you on brilliant and well earned success. "Huntington."

Meeting of the Society. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 W. 39th St., on Tuesday evening, Feb. 20, 1912. Vice-President Greenough in the Chair. The following persons recommended by the Council were elected to Fellowship:

Miss Mary E. Harrington, William B. Beam.

The Chairman then introduced Mura Bayly, F.A.G.S., who addressed the Society on "New Zealand." Lantern views were shown.

NORTH AMERICA

Arizona a State. President Taft, on Feb. 14, signed the proclamation declaring Arizona to be a State of the Union. The new Commonwealth adds the forty-eighth star to the flag and brings into the sisterhood of States the last bit of territory in the United States, south of Canada.

The New Madrid Earthquake. Beginning on September 16, 1811, and lasting more than a year, a succession of severe earthquake shocks known as the New Madrid Earthquake, so named from a town now standing on the Mississippi River, occurred in the Central Mississippi Valley, and extended over southeastern Missouri, northeastern Arkansas and western Kentucky and Tennessee. These shocks were not equalled in severity and continuance of disturbance by the famous earthquakes at Charleston and San Francisco. Little attention was paid to the phenomena at the time because the region contained very few white residents. In its scientific aspects, this earthquake may be regarded as a type exhibiting, in unusual detail, the geological effects of great disturbances upon unconsolidated deposits. In this sense its phenomena have much importance and it is gratifying that the U. S. Geological Survey has issued a monograph (*Bulletin* 494, 119 pp., Maps and Ills.) entitled "The New Madrid Earthquake," by Myron L. Fuller, in which the author has brought together, with great care and thoroughness, all the data he has been able to collect concerning the earthquake; and he discusses its details in the light of our present knowledge of seismology. His sources of information were "the quaint, picturesque and graphic accounts of contemporaries, and the equally striking geographical and geological records which even now may be clearly read at many points in the region."

Mr. Fuller says, with regard to the ultimate cause of the earthquake, that, as the center of activity of the primary shocks was within the embayment area and well removed from the surrounding area of consolidated rocks, it seems clear that the ultimate cause lies in forces operating beneath the embayment deposits. The action may be associated either with the processes of folding or warping or incident to a depression and deepening of the basin.

GEOGRAPHY AND AGRICULTURE IN WISCONSIN. In Wisconsin, where an increase of 47 per cent. in the number of cows between 1900 and 1910 was accompanied by so large a production of butter, cheese, and milk that the State now ranks first in the United States, having passed New York, in the value of dairy products, the economists interested in agricultural statistics have been applying geographical methods to the interpretation of their data. One of their reports (H. C. Taylor and C. E. Lee, "Progress of the Dairy Industry in Wisconsin", Wis. Agr. Experiment Sta. *Bull.* 210, June, 1911, pp. 1-30) is illustrated by a series of small maps of the state upon which the grouping of dots in the several counties to show the distribution of cows, hay or corn, creameries, skimming stations, condenseries, and cheese factories, enables one to read graphically the relationships of these agricultural items to the topography and climate, shown in the text in a relief map of the State and a map showing length of growing season.

The text, though mainly concerned with agricultural matters, does not neglect geography, discussing specifically, for example, the relationships of a geographical topic like the nationality of the population. The Swiss are seen from one map to be largely concentrated in one county where the combination of favorable climate, etc., with the knowledge, skill, and imported habits of the Swiss immigrants have evolved 213 cheese factories and of course a great production of Swiss cheese.

The nearness of southern Wisconsin to the Chicago market and direct transportation have naturally affected the great increase in dairy products during the last decade (70 per cent. increase in butter and 86 per cent. increase in cheese), but the maps show that this is a minor control compared with the suitability of topography, soil, and climate for the development of the dairy industry.

LAWRENCE MARTIN.

NORTHERN SELKIRK MOUNTAINS. During June and July, 1911, Mr. Howard Palmer, Secretary of the American Alpine Club, with Professors E. W. D. Holway and Frederic K. Butters of the University of Minnesota, continued his exploration of the region about Mt. Sir Sandford (51°39′ N. and 117°50′ W.) in the northern Selkirk Mts., begun in 1908 and 1909 (cf. *Appalachia,* Vol. 12, No. 1, 1909, pp. 16-30 and *Geogr. Journ.,* Vol. 37, No. 2, 1911, pp. 170-179; both with maps). Detailed investigation was made of the rates of flow and of recession of Sir Sandford Glacier, the results of which will be published as soon as possible. In addition a reconnaissance photo-topographic survey based on instrumental triangulation was made of a considerable area in the unexplored mountainous district included in the "Big Bend" of the Columbia River. The exceedingly irregular crest-line was traced for some twenty-five miles and, except for the gap discovered by Moberly in connection with the Canadian Pacific Railway surveys between 1870 and 1872, no timbered pass leading from the N. W. flowing course of the Columbia to its S. S. E. flowing section was observed. A continuous meteorologic record was kept by means of a portable barograph and minimum and black-bulb thermometers. Altitudes were estimated by aneroid barometer, checked by boiling point thermometer and barograph.

In August the party traversed the valley of the North Fork of the Illecillewaet River to its head and continued their explorations in this vicinity. In all, eight peaks above 9,000 feet were ascended, of which seven were first ascents. The mountains along the divide are heavily glacier-laden and support several extensive névés.

THE CARIBOO MOUNTAINS. Professor J. Norman Collie, of Canada, read before the Alpine Club of London on Dec. 10 last a paper on "On the Canadian Rocky Mountains North of the Yellow Head Pass," which the Grand Trunk Pacific is now making accessible to mountaineers. The region which Prof. Collie describes will before long, undoubtedly, be popular among tourists and mountain climbers. The author says about the Cariboo Mountains, which are just coming into notice:

"We climbed a peak on the east side of the Moose Valley and away to the west beyond Tête Jaune Cache and the Fraser River, I saw for the first time the Cariboo Mountains [a little S. of 54° N. Lat. and E. of 122° W. Long.], and I was surprised to see how fine they were. From many of the Rockies further south I had seen the Selkirk range, but they are not, in my opinion, at all equal to the Cariboo group. Two especially fine peaks could be seen; a great snow field with a grand glacier coming down eastwards towards the Fraser River. This mountain land should prove a great field for the mountaineer. Up to the present, as far as I know, not a white man has ever penetrated into its fastnesses. I have heard stories of how even the most adventurous of prospectors have been turned back. This is not surprising to anyone who has had to deal with dense British Columbia forest. Huge fallen trees, thick underbrush full of that pest the devil's club, turbulent glacier streams, can render a valley quite impassable. Any one who has attempted to reach the high mountains on the west of the watershed either in the Selkirks along the Columbia River or in the Rockies, knows that he will never try again. Possibly, however, when the Grand Trunk Pacific railway has opened up the Fraser Valley, it will be possible to get men who, with two-handed saws and axes, can clear a trail, but both money and time will have to be spent before anyone will win to this magnificent group. It will, though, be well worth accomplishing, for the Cariboo Mountains are certainly as high—perhaps even higher—than the Selkirks; the peaks are finer shaped, and there are some narrow gorges (especially one to the north end of the group) that must afford grand scenery. If what is marked on McEvoy's map be true—namely, that they belong to the Archæan formation—they are certain to possess fine form, for the Archæan rock weathers into the most picturesque details."

MR. RADFORD IN NORTHERN CANADA. Mr. Harry V. Radford writes to the *Bulletin* that he arrived at Spurrell Harbor, mouth of Chesterfield Inlet, with his assistant T. George Street, on Sept. 30, finding there the promised relief supplies landed for him by the Hudson Bay Company's steamer *Pelican* in September. He expected to leave Spurrell Harbor on Oct. 4 to return up Chesterfield Inlet and go with dogs and sledges 270 miles westward to the head of Schultz Lake, where he and Street intended to winter with the Eskimos. They will try to reach the Arctic Coast in the Spring at or east of Bathurst Inlet and proceed inland.

THE GLACIAL GREAT LAKES IN CANADA. Goldthwait, to whom we owe so much of the revival of the study of the glacial Great Lakes by the introduction of detailed instrumental surveys of their abandoned strand lines, has extended his studies, under the direction of F. B. Taylor, from Wisconsin and Michigan to the eastern shore of Lake Huron in Ontario. (Goldthwait, J. W., "An Instrumental Survey of the Shorelines of the Extinct Lakes Algonquin and Nipissing in Southwestern Ontario," Memoir No. 10, Canada Department of Mines, Geological Survey Branch, 1910, pp. 5-48). Measurements were made in 1908 with a wye-level. The Algonquin beaches vary in level at present from about 25 feet above Lake Huron near its outlet to 314 feet at the northernmost locality studied. They are horizontal at the southern end of the lakes (607 feet above sea level), as the Algonquin strands are in southern Lake Michigan, and then slope northeastward at grades of from 1.43 to 3.6 feet to the mile.

The Nipissing shoreline, 15 to 58 feet above Lake Huron, shows a similar, though less marked, deformation with horizontality in the south (596 feet above sea level) and grades of 0.11 to 0.57 feet to the mile. The remarkable agreement of results throughout a wide area around the shores of Lakes Michigan and Huron thoroughly justify the time and expense given to these detailed instrumental observations; and the determination of lack of disturbance in the southern part of the area of these glacier margin lakes makes it possible to use these elevations as planes of reference, subtracting 607 feet from the present altitude of any Algonquin beach and 596 feet from the altitude of any Nipissing beach, to determine the amount of uplift of a region since Algonquin or Nipissing time. LAWRENCE MARTIN.

SOUTH AMERICA

THE CONTINENTAL WATERSHED OF PATAGONIA. Mr. P. D. Quensel, a member of the Swedish Magellanian Expedition of 1907-1909, spent most of two summers on the eastern slopes of the Patagonian and Fugian Cordillera, chiefly occupied with petrological studies, but noting also the glacial geology of those regions to which he calls attention as offering a wide and interesting field of work. The Society has received a paper by him "On the influence of the Ice Age on the Continental Watershed of Patagonia" (Reprinted from *Bull. Geol. Instit. of Upsala.* Vol 9, pp. 60-92, 2 maps in colors, and 12 ills.), from which his principal conclusions are here summarized. His studies point to the conclusion that the ice-divide, during the ice age, generally followed the Central Cordillera range, though the present watershed, often consisting of glacial deposits, is chiefly situated to the east of the mountains, indicating the limits of the latest Cordilleran glaciation. Until towards the end of the ice age the transandine valleys must have been filled with an ice-barring outlet in that direction and the drainage of the eastern Cordillera must have followed the pre-glacial Pampean valleys to the Atlantic. On account of the slight slope of the transversal valleys the rivers have had but small erosive power and have therefore not been able to cut through the extensive glacial deposits and drain off the lakes, which were hollowed by powerful glacial erosion and are without doubt of great depth.

In preglacial time, low passes of erosion must have existed in many places in the Cordillera. Through ice accumulations in these depressions, the passes may have been lowered by glacial erosion, mighty streams of ice from the central mountains following these depressions both east and west. The western parts of the sub-andine lakes resemble the fiords of mountain regions which were once the seat of glaciation. The marked tendency of many of the fiords of the sub-andine lakes, to stretch in a north-south direction is probably due to the tectonic depressions or faults, caused by the forming of the Cordillera range to which they are parallel.

The author draws attention to the relation between the principal sub-andine lakes and the present inland ice of Patagonia. With a break of only 60 km. a continuous field of ice covers the central Cordillera for over six degrees of latitude from the Kirk Narrows in the Ultima Esperanza district nearly to the pass of the Aisen River. Further north the general appearance of the mountain range changes; though mighty glaciers are still found, the glaciation is of a more local character and confined to the highest mountains. All the large sub-andine lakes are found in the region of the inland ice. All the trans-andine passes of the southern regions have their source from sub-andine lakes, whereas, further north, though the general system is the same, the lakes have been drained off. Even during the glacial period there was evidently a much more limited glaciation in the Cordillera between Nahuel Huapi and Aisen than further to the south, which led to decided differences in the orography of the present day.

Miss Annie Peck's Latest Ascent. Miss Peck, who has recently returned from South America, sends to the *Bulletin* this note on her latest ascent:

"I made, last summer, the first ascent of the mountain massif Coropuna, in the coast range of Southern Peru, from the town of Viraco on the south slope. I ascended two peaks, the only ones visible from that side. From their summits, I saw several more farther back, but as there was a gulf between and as it was evident from my hypsometric observations that the elevation of the mountain on which I stood was less than that of Huascarán, I thought it hardly worth while to attempt the others with my very limited resources. I had no Swiss guides and was much pleased at being able to make the ascent on the first trial. Of course, it was far less difficult than Huascarán.

"My companions on the summit of Coropuna were Señor Ricardo Carpio, Peruvian, Mr. Carl Volkmar, German-American, and four Peruvian porters, seven of us altogether."

AFRICA

Rhodesia. The report of the British South Africa Company for the year ending March 31, 1911, announces that the two territories hitherto known as Northeastern and Northwestern Rhodesia will hereafter be administered as one territory under the name of Northern Rhodesia. The progress in farming and ranching in Northern Rhodesia gives much promise for the future of these industries. A large area is suitable for cotton and the prospects of cattle raising are excellent. The rapid development of the mineral district in Katanga, Belgian Congo, has made a good market for all kinds of farm produce, and Rhodesian farmers are now able to reach this market by the extension of the Rhodesian railroad to Elizabethville in this mining region. In the whole of Rhodesia the European population has increased by more than 87 per cent. since the census of 1904. In the past year, 330,000 acres of land were sold, the gold output was $13,239,480, the net receipts of the railroads showed an increase of $1,270,000, and the gross imports, an increase of $2,850,000 over the previous year.

Cotton Growing in Northern Nigeria. The Governor of Northern Nigeria says in the *Annual Report* on the Protectorate for the year ending March 31, 1911, that strenuous efforts are being made to encourage the natives to grow cotton on a large scale. Experimental plots have been established at various centers. As soon as the natives begin to realize that cotton is a crop for which there is always a ready sale to an unlimited extent they will embark largely in its cultivation. The Governor believes that, under proper guidance, there will be a steady and continuous increase of production. The people have for centuries grown cotton and have little to learn as regards methods of cultivation. The present problem is the improvement of the local varieties of cotton and the discovery of the means to increase the productivity of the plants. He thinks that the prospects of cotton growing on a large scale are especially promising in the fertile lands bordering on the Niger and Benue.

ASIA

THE NEW CAPITAL OF INDIA. *The London Times* (Weekly edition, Feb. 9, 1912), says that Parliament will be asked to give statutory authority to the Government of India Bill which will declare Delhi to be the capital of India and will authorize the constitution of that city and a defined area around it into an Imperial *enclave*. The *enclave* will cover an area of over 180 square miles, most of it taken from the Delhi Division of the Punjab.

THE METRIC SYSTEM IN JAPAN. The Decimal Association, Great Britain, announces that the King of Siam, on Nov. 15 last, ordered the adoption of the metric system throughout that kingdom. The Siamese authorities have taken steps to procure from the Bureau Internationale des Poids et Mésures, in France, standards and prototypes for furnishing a Central Office of Weights and Measures in the kingdom. The system will be introduced in about a year and, twelve months later, the law will be enforced throughout Siam.

AUSTRALASIA AND OCEANIA

MATAVANU VOLCANO QUIESCENT. Dr. K. Sapper reports (*Zeitsch. Gesell. f. Erdk. zu Berlin,* 1911, No. 10, pp. 701-704) that the activity of Matavanu, in the island of Savaii, Samoa, has ceased. Dr. Grevel wrote to him, on Aug. 15, 1911, that for a month the lava flow into the sea had stopped, that a hard smooth surface covered the lava lake and further outbreaks seemed improbable. In October, Father Mennel wrote that since the end of August the volcano had the appearance of being extinct. Its activity had been gradually decreasing for about nine months, and it is deemed probable that a long period of quietude will now ensue. The outbursts began in August, 1905. A crater opened in a valley from whose outpourings a new volcano was built up to a height of 2,000 feet, obliterating the valley, which became a huge ridge about 1,500 feet high. About 30 square miles were covered with lava, the flow over a considerable area exceeding 1,000 feet in thickness. A part of the sea, between the shore and the coral reef, was filled with the ejecta. The eruptions were very violent throughout 1906, and also at various periods since then. Dr. Sapper urges that persons competent to make a careful study of the phenomena of the Matavanu eruptions should be sent to Savaii.

POLAR

ICE CONDITIONS IN THE ARCTIC SEAS IN 1911. The annual "Isforholdene i de arktiske Have" for 1911, published by the Danish Meteorological Institute, has appeared with Danish and English text in parallel columns as usual. The data received from Bering and Beaufort Seas, Bering Strait and Kara Sea were too inadequate to give much idea of the state of the ice in those regions. There was an unusual amount of ice in the Greenland Sea and in April and May the ice boundary extended from the east coast of Iceland to the east of Jan Mayen. About June 15, however, vessels had no difficulty in reaching Angmagsalik, the Danish port in East Greenland. The five accompanying maps show the ice conditions as far as known for the months of April-August.

PHYSICAL GEOGRAPHY

THE SALINITY OF THE ATLANTIC OCEAN. That differences of salinity in different parts of the same ocean are largely due to meteorological controls has long been known. Thus, in the trade wind belts, with abundant evaporation, the salinity is greater than it is in the doldrum belt, with its heavy rainfall and cloudy skies. A recent discussion of the problem of the salinity of the oceans, by Dr. Alexander Woeikow ("Der Salzgehalt der Meere und seine Ursachen," *Pet. Mitt.*, Jan. and Feb., 1912), brings forward an interesting explanation of the differences in salinity between the three great oceans. This explanation rests largely upon meteorological controls, and in view of the thorough study which the author is known to have given to this whole subject the paper is worthy of attention.

The greater salinity of the Atlantic as compared with that of either of the other oceans, which exists in spite of the fact that the continental areas which drain into the Atlantic are larger than those in the case of the Pacific and Indian Oceans, is explained as follows: The mountain ranges bordering upon the Atlantic are neither high nor very extended. The water vapor, from evaporation over the Atlantic, is carried far into the continents, and a large part of the resulting precipitation does not return to the Atlantic. Thus, for example, in the case of Eurasia, Woeikow points out that under the influence of the upper and lower westerly winds, and also partly of that of the southerly winds, the water vapor from the Atlantic and its mediterranean seas is carried beyond the Atlantic drainage areas. In Turkestan, balloon and kite observations show the prevalence of westerly winds of considerable velocity a short distance above sea-level. This fact leads to the belief that the water vapor which is precipitated as rain or snow in the Tian Shan is derived from the Mediterranean. From the Atlantic directly there may even be a transportation of water vapor, in the anti-trades, far to the east. The Sahara, also, receives and does not give back, a supply of water from the Atlantic. The loss of water vapor thus brought about, and not compensated by an equivalent inflow of water in rivers, is thought by Woeikow to be the principal cause of the great salinity of the Atlantic. In the Pacific and Indian Oceans the weather does not find a similar loss of water vapor, owing largely to the better enclosure of these oceans by the higher altitudes of the surrounding continents. The Atlantic Ocean thus experiences a definite loss. Dr. Woeikow knows the meteorology of the Aralo-Caspian area so thoroughly that his explanation of the transportation of Atlantic water vapor into that region must be received with serious attention. It is, in the nature of the case, impossible to give any definite proof of the correctness of the theory. A map of the salinity of the oceans, of the altitudes of the continental margins, and of the drainage areas accompanies the article.

R. DEC. WARD.

OBITUARY

Arthur de Claparède. Prof. de Claparède, eleven times President since 1891 of the Geographical Society of Geneva, Switzerland, died on Dec. 13, 1911. He was born in 1852, and though never in robust health, he traveled extensively and for many years, was widely known as a writer on geographical and economic topics. He was among the leaders of the development of geographical education in Switzerland. He was President of the Ninth International Geographical Congress at Geneva in 1908 and represented Switzerland in 1904 at the Eighth Congress in the United States.

A. H. Keane. Dr. A. H. Keane, the anthropologist, died in Hampstead, England, on Feb. 3, 1912. He was born in Cork in 1835. He was not a field worker, but his literary training and wide knowledge of languages especially fitted him for collation and synthesis. He wrote many admirable monographs and a number of books on geographical and anthropological topics. Among his best-known works are his "Ethnology" (1896), "Man Past and Present (1899), and "The World's Peoples" (1908). The usefulness of his work is largely due to the vast extent of his reading and his systematic method in arranging and presenting the observations of field students.

CORRESPONDENCE

MAP READING

To the American Geographical Society: A recent magazine article on "Maps and Map Making" refers to the little knowledge of map reading among our students and the failure to teach the subject in our schools. In supplying the U. S. Geological Survey sheets to local schools I have found them little appreciated. It is enjoyable to travel with good maps in hand; and on auto or bicycle tours at home and in England, France, Italy and Switzerland, my pleasure and profit have been much enhanced by using the excellent maps of those countries. As a traveler, I know that one sees only what his intelligence, education and training fit him to appreciate and understand. I greatly regret that our schools are so slow in taking up the subject of teaching their students how to get all the information that really good maps supply to those who can read them.

Henry N. Francis, Am. Soc. C. E.,
Providence, R. I., Feb. 23, 1912.

MOUNT TACOMA

To the American Geographical Society: I enclose a newspaper clipping relative to an application to the U. S. Geographic Board in Washington asking that the old name of Mount Tacoma be restored. It is regrettable that the old Indian name should have been taken away and replaced by that of an unknown foreigner, mainly on account of the rivalry of two cities. I was there in 1882. At that time Tacoma and Seattle were great rivals, Tacoma slightly leading in population. Everybody in Tacoma called the mountain "Tacoma," but Seattle hated the name as it was her rival's and spoke of it only as Mt. Ranier. As Seattle later became a great railroad terminus and grew to be larger than Tacoma, the name Mt. Ranier became fixed and the railroads naturally published it in their guide-books and time-tables. It has seemed to many persons wrong to take away the Indian name and I am very glad if a movement is on foot to have it restored.

William Boerum Wetmore,
Allenhurst, N. J., Feb. 5, 1912.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

AMERICA

The Making of a Great Canadian Railway [Grand Trunk Pacific Railway]. By Frederick A. Talbot. 349 pp. Map, ills. and index. Seeley, Service & Co., Ltd., London. 16s. 9 x 5½.

A vivid description of the organization and construction of the Grand Trunk Pacific Railway based on personal investigation by the author in 1910. Two introductory chapters are devoted to the part played by Charles M. Hays in revitalizing the Grand Trunk Railway by extending it to the Pacific. The remainder of the book deals in detail with the building of the road, the difficulties met with and how they were overcome, the experiences of the surveyors and life in the railroad camps.

Although the book is avowedly "intended for those who are interested in the romantic side of railway-building," a sufficient knowledge of geography as an element of general culture could be expected so that such statements would be impossible as those which ascribe to the "Japanese [*sic*] chinook wind" the equable climate of the northern Pacific coast (p. 35). The condemnation of the government maps (p. 50) on the ground of their inadequacy for the purposes of the railroad engineer reveals, too, a lack of appreciation of their scope. Again, although the text deals at length with the means by which the mountain barrier was overcome, the accompanying map places the Rocky Mountains along the axis of the Interior Plateau of British Columbia, in no causal relation with Mt. Robson and Yellowhead Pass, both of which are represented on the map.

Nevertheless, the book is on the whole valuable, mainly because it furnishes information, otherwise not readily available, concerning an undertaking of far-reaching importance. W. L. G. J.

The Pan American Union. Peace, Friendship, Commerce. By John Barrett, Director-General of the Pan American Union, Washington, D.C., 1911. 254 pp. Ills. $1. 8½ x 6½.

A handbook of information on the Southern republics, their resources, population, area, commerce and progress; and the work, scope and history of the Pan American Union. The book is well illustrated.

Down North on The Labrador. By Wilfred T. Grenfell. 229 pp. Ills. Fleming H. Revell Co., New York, 1911. $1. 7½ x 5.

This is a collection of sketches and stories by Dr. Grenfell. The stories are well written and entertaining, although they are open to the criticism that the characters are idealized. The book gives an admirable picture of the life along this barren coast with the constant struggle against great odds. The winter in all its severity, expeditions for relief during all kinds of weather, now and then a comparison with more favored conditions and above all the simple faith of these brave men and women whose lives are unending battles against the hardships of an inhospitable land and a changing sea, form the themes of most of the stories. R. M. Brown.

AFRICA

Notre Beau Niger. Par Félix Dubois. 299 pp. Map and illustrations. E. Flammarion, Paris, 1911. 5 Fr. 8 x 5.

This is an account of fifteen years of French colonization in the Sudan and especially along the Niger River. The journey of the author began at Algiers. The first stage of his travels was across the Sahara to Gao on the Niger. The account of the author's wanderings in the desert region is reserved evidently for another volume, "L'énigme du Sahara," advertised to appear soon The second stage of the journey begins at Gao, and, after various stops along the way, ends at Bammako, far up the Niger. The author is a firm believer in the possibilities of the French Sudan, and the reader must be constantly on guard lest he be swept along by the enthusiasm of the writer and thereby expect to find in this portion of Africa the sole example of great achievement in colonization. Some of the author's extravagances may be accounted for by understanding that it seems necessary to him to overcome considerable opposition in his native land, where many have been taught that the French Sudan is one of the more refined parts of the lower regions. Dubois reports the country as yielding nothing to the Nile country in promise. In this spirit the author visits and recounts the present conditions of the towns of Gao, Kabara, Timbuktu, Mopti, Djenné and finally Bammako. In the chapter on Kabara, the port of Timbuktu, there is an account of the postal service of the country and an interesting comparison of the conditions of former journeys, replete with tragedy, from Kabara to Timbuktu and the journey to-day with all its comforts along a beautiful and comfortable highway, "le Boulevard et le Bois de Boulogne de Tombouctou." The chapters on Timbuktu describe the life there, and in dealing with the past the old account of the discovery of Timbuktu by Robert Adams is rehearsed, which the author discredits, characterizing the action of Adams as a "bluff." The volume contains, besides the details of the journey, many interesting things, such as the construction of the hotel at Kulikoro in a manner to withstand the ravages of the ants, the railroads already constructed, for which the author has excessive praise, the projected lines, an interesting account of the introduction and production of cotton and a Sudanese school. R. M. Brown.

Erwachende Agrarländer. Nationallandwirtschaft in Ägypten und im Sudan unter englischem Einflusse. Von Siegfried Strakosch. xii and 235 pp. Map. Verlagsbuchhandlung Paul Parey, Berlin, 1910. M. 7.

The "agricultural countries in process of awakening" of which the author speaks are Egypt and the Anglo-Egyptian Sudan. He discusses the possibilities of these two countries from the point of view of what he calls *national agriculture,* that is to say, in judging the agricultural status of a country he first examines the natural conditions which the agricultural methods must meet in order to be successful, and then determines the value of those methods, not by their degree of up-to-dateness according to modern European standards but by the degree in which they are adapted to those natural conditions. Taking the plough for an example, he shows that the quasi-antediluvian instrument which the

Fellah uses answers the purpose much better than any modern plough could, and explains why such a one will probably never do on Nile soils.

Modern methods will be, on the other hand, a great factor in the further development of Egypt wherever irrigation is required, because wide tracts of the land are deserts without it, while they bear one crop every year when flooded, and two or even three crops when irrigated by means of ditches. In this respect, indeed, the country is not only behind the times but even behind its own past; for it is as good as proven that the area under cultivation was larger in the times of Old Egypt than it is now. The reason is that irrigation works require capital and a concentration of power, both of which have been lacking in Egypt for centuries, because, by virtue of a very peculiar lease system, the large landowners had taken almost no part in the cultivation of their lands, but left the care of them entirely to the Fellah tenants, who, each on his own small farm, were unable to handle such a large problem.

The Anglo-Egyptian Sudan, which extends from the second cataract to the Belgian Congo and covers about 1,000,000 square miles, is not such a homogeneous agricultural and historical unit as the Nile valley. Although it was successively under the influence of Egyptian, Christian, and Arabian culture, its agricultural system bears no trace of any of them, but is distinctly of the negroid type. The negro never rises above small farming and employs neither instruments nor cattle in tilling the soil. The author estimates that there are about twenty ploughs in the whole country north of Khartum, and exactly ten south of that place, viz. the 10 wooden ploughs bought by the government for their experiment farm on the Blue Nile. Rains are more frequent than in Egypt, but not very regular, so that the negro farmers become almost nomads by being obliged to migrate from one place to the other according to the occurrence of the rains. Others stick invariably to the same places, because they live in such strained relations with their fellow tribes that they must remain stationary in order to maintain their claim to the soil. On the whole, the population of this part of the Sudan is very scarce, and the country might support many times the actual number of inhabitants, so that the stimulus for improvement is entirely absent because there is always food enough for everybody.

The Anglo-Egyptian understanding about this part of the Sudan is a kind of symbiosis which benefits both Egypt and England. England needs the Sudan because it controls the fate of Egypt by controlling the upper Nile, and also for the sake of the Cape-to-Cairo railroad. But it would be very difficult for England sufficiently to assert her authority at such a distance from the home country, in an almost inaccessible region where neither troops nor provisions could be dispatched with any degree of promptness, and in the midst of a hostile population. Egypt is nearer, locally and historically, and it has an excellent army. The alliance with Egypt enables England, therefore, to preserve peace and order at the least possible expense, while to Egypt the organizing skill and colonial experience of England is a great help in establishing a civilized government.

In Egypt the signs of an agricultural awakening are noticeable everywhere. The irrigation works, and the area under cultivation likewise, are continually increasing, and in this process the Fellahs are proving a very valuable element. Although they cannot be called a race anthropologically, they certainly are the descendants of the farmer caste of Old Egypt who love the soil which they till, and since the reform of the tax system has improved their general economic situation, the younger generation has become less fatalistic and indifferent, less distrustful of innovations than it was before. The demand for fertilizer increases and the fields become more and more productive; the Fellah begins to appreciate the work of the Khedivial Society, and he sends his children to school.

The number of and interest in the schools has increased wonderfully since the British occupation. The school budget rose from £2,300 in 1881 to £450,450 in 1906, and private benefactors vie with each other in endowing institutions of learning. There are at present 4,324 Kuttabs (village schools), besides many higher primary and secondary schools, engineering schools, girls' schools, normal schools, trade schools; there is an Agricultural College at Ghizeh, and the idea of a modern national University of Egypt is gaining ground more and more rapidly.

The most meritorious body, for the agricultural development of Egypt, is the Khedivial Agricultural Society of Egypt. It was founded in 1898, as a free association of paying members, mostly farmers, which was to arrange exhibits, make experiments, encourage agricultural research, procure seeds and fertilizers, and promote the interests of the members and of agriculture in Egypt generally. It was reorganized in 1904, for the purpose of establishing branch associations, under the leadership of graduates of Ghizeh College, in all the fourteen provinces of the country. If things continue at this rate, the area under cultivation in Egypt will soon be doubled.

In the Sudan similar progress cannot be expected so soon. The problem there is not how to awaken an old civilization from a sleep of centuries but how to create a new one literally out of nothing, in a region where everything seems to conspire against it; abundance and want, each fatal to progress in its own way; climate, desert, jungle, disease; enormous distances, lack of roads, sparsity of population. The thorough knowledge of these conditions is the first prerequisite to any attempts at cultivation, and therefore the work of the English has been limited so far to the study and opening up of the country itself. The investigation of the climate and soils, water supply, domestic products, and the character of the population, the fight against sleeping sickness, the building of roads and telegraph lines and, especially, the establishing of law and order, without which products can neither be raised nor brought to market, have so far absorbed almost all the work of the English pioneers. As the size of the country is a great obstacle to the work of experiment stations, conditions being so different in different regions that the results obtained have, comparatively, but a limited value, the governmental institutions at Khartum are sending out traveling teachers to work in the different provinces. They are obtaining satisfactory results.

Educationally, too, everything is yet in the initial stage. In the northern provinces a number of "Kuttabs" have been founded, and teachers' courses at Gordon College, Khartum, at Omdurman, Suakin, and Rufaa, are to supply instructors for them. There are also six higher primary schools, and three trade schools. The missions, too, are doing very satisfactory work for the general uplifting of the country, even where they do not make many converts; where they do, they also establish schools and hospitals. The greatest agricultural problem which confronts the government is the creation of a regular water supply, because the water needed for irrigation would either diminish the share of Egypt, or have to be taken from regions upstream which are partly on foreign territory. When this problem is solved, and the general intellectual standard of the population somewhat improved, there is good reason to hope that the combination of foreign capital and domestic labor will secure to this part of the Sudan a foremost place among the producers of tropical and subtropical products. MARTHA KRUG GENTHE.

ASIA

The Kingdom of Afghanistan. A Historical Sketch. By G. P. Tate. ix and 224 pp. Maps and index. Bennett Coleman & Co., London, 1911. 9½ x 6½.

Having had dull experience with this style of composition, the French critics have hit upon a classification, with an unwritten wealth of connotation, as *materiaux pour servir.* It contains in full measure the material upon which the history of Afghanistan may be written. It bears every mark of careful research, of collation of a great number of rare and almost inaccessible documents, of accurate presentation of both sides of moot questions. An introduction by Sir Mortimer Durand is indicative of the appreciation in which the author's diligence is regarded by that high authority; yet Sir Mortimer does not wax enthusiastic over the result, nor does he agree entirely upon all points. In manner lacking the least spark of that dash with which the Afghan tribesmen have made their inroads upon the history of India, the matter of this volume is entitled to the most serious consideration. Very little has yet been discovered as to the genetic source of the Afghans, probably it will be little more than a pamphlet in the history of inner Asia, but an inordinate amount of space is given to the discussion of an origin from the lost ten tribes of Israel; even the missionaries have given over the attempt to write that professional mystery of their art into serious ethnography. But when the author arrives at the period of documented history he gives a concise summary of the campaigns of different Afghan rulers directed upon Persia on one frontier and upon India on the other, showing particularly the result this activity had upon the consolidation of an Afghan state. In the most modern period he is obscure, probably of political design, upon the status of Afghanistan as the buffer between Russia and England at the scientific frontier. WILLIAM CHURCHILL.

Afghanistan: The Buffer State. Great Britain and Russia in Central Asia. A Comprehensive Treatise on the Entire Central Asian Question. By Capt. Gervais Lyons. With an Introductory Note by Sir Reginald C. Hart. vii and 232 pp. Maps* and index. Luzac & Co., London, 1910. 7s 6d. 8½ x 5½.

From the time when Semiramis, Queen of Assyria, invaded India, there has been a Central Asian question, and during most of these years it has been a very complex one. A book, then, which attempts to explain the various stages and results of past invasions and the present diplomatic intrigue is valuable, and, in view of the recent disputes in Persia, enlightening; yet inasmuch as it is written by an Englishman, a representative of one of the countries in this border-land strife, one must expect to find the trend of the book favorable to the English occupancy of the Iranian plateau. The book opens with a statement of the English point of view, to wit, that Persia, Afghanistan and Western China remain independent and favorable to the British, that the Bosphorus be closed to Russia and that Russia be prohibited a port on the Persian Gulf. The value of India to the British government is given in detail, and the means of protection along the frontier of that country and the distribution and occupation

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*Listed under "Asia" and "The Nearer East" in *Bull.*, Vol. 44, No. 2, Feb., 1912, pp. 157 and 158, respectively.

of the army of defense are indicated. The whole chapter is permeated with the expectation of a clash with Russia for the possession of India. In succeeding chapters, the past invasions of India and the progress of Russia in Central Asia are rehearsed. Following this review of events, the author attempts to explain the Russian point of view concerning an advance into India, and while he tries to present both sides fairly, the bogy of the advancing enemy is always present. The author describes the theater of operations which includes the lowland of Turan, the Central Asian mountain region and the plain of the Indus; and he describes the paths, railroads and trails intersecting the area, the condition and high water time of the streams and lists the passes into India. Following are chapters on the countries and peoples of this area and a statement of the present distribution of the Russian army in Central Asia. The book contains much valuable information. R. M. BROWN.

Aspects of Religious Belief in Babylonia and Assyria. By Morris Jastrow, Jr. xxv and 471 pp. Map, 54 ills., chronological lists of the rulers of Babylonia and Assyria, and index. G. P. Putnam's Sons, New York, 1911. 8 x 5½.

The prime appeal of Dr. Jastrow's book is to the students of comparative religion. Yet it is interesting to see how much of the work bears upon the geography of the Euphrates Valley, an unexpected yet on second thought wholly natural result of the fact that any work of such ripe scholarship must be broad and not narrow, fecund and never jejune. At base, the story of the great gods must be the story of the greater men who believe in them, who, in a broader view, have created them anthropomorphic. Dr. Jastrow has addressed his conclusions to those students who are interested in the study of the growth of the divine idea out of a congeries of village, municipal and racial gods keeping even pace with the growth of the earliest civilization of which we have record. To the furtherance of his object he draws extensively, always brilliantly, upon the store of literary material which fresh exploration is bringing to light in the Assyrian-Babylonian region and which is daily becoming better interpreted and better comprehended. Equally with divinity is geography revealed in the course of such study, the geography of folk movement and folk settlement. Out of this rich store we have space to note but one instance of this contribution of theology to civic geography. Associated with the temples of the alluvial plain are found tower structures in courses, to which has been assigned the name *zikkurats.* These towers, the author points out, are the machinery of the worship of the mountain gods, the "high places" of Old Testament heresies, the Jacob's ladder of an earlier myth. Their presence in the plain and in the double delta argue a movement thereunto of settlement of a race of mountaineers. We need not pursue the intricate yet convincing ingenuity of his argument in the establishment of the home land of this remote migration; it is enough to point out the method whereby the gods are made to trace out the archaic highways long ages after the wind has swept away even the dust by themselves contributed in which these ancient wanderers left their footprints. We note, however, that having served their end in this line of proof the *zikkurats,* of which the Babel tower was a type, have survived without meaning in the religious architecture which gives to the mosque its minaret and to the cathedral its twin spires. It is as much pleasure as surprise to find that the cuneiform slabs of the temple records can be read to set forth the geography of Sumer and Akkad. The gods themselves have preserved the ancient landmarks of the time when the world was young. WILLIAM CHURCHILL.

Casuals in the Caucasus. The Diary of a Sporting Holiday. By Agnes Herbert. xi and 331 pp. 22 ills. John Lane Co., New York, 1912. $4. 9 x 6.

An account of the hunting experiences of two women and a man in the Caucasus, describing a hunting trip into the highlands of Daghestan and another, over the Caucasus to the shooting grounds of the northern foot-hills. The book contains some charmingly told hunting experiences, describes interestingly the natives of the region and gives glimpses of the ways of wild life. But no definite picture of the areas traversed is possible from reading the book, and there is no map. R. M. BROWN.

India. Its Administration and Progress. By Sir John Strachey. xxiv and 567 pp. Map and index. Macmillan & Co., Ltd., London, 1911. $3.50. 9 x 6.

The history of Sir John Strachey's great work, the acknowledged standard of reference for the facts of Indian politics and economics, is embraced in the record of its progress. A soldier with that rare sympathy with the foe which seeks to leave him in the best plight after his submission, an administrator with a genius for soothing turbulent communities, the author displayed in his first edition a massive plan on which the political history of the British rule was to be written. This was in 1888. In six years the changes in India made necessary the second edition of 1894. Yet another period of eight years showed the work, already become standard, to be authoritative in scope but laggard in detail. The third edition was published in 1903. It is a great tribute to the quality of this work that so competent a student of India as Sir Thomas Holderness finds that when eight years later a fourth edition is called for he can do no better than to bring the work from the point where Gen. Strachey laid it down up to the present situation by adding notes at the bottom of the page or at the end of the chapter. Thus it enters upon a new period of that authority which it has already held during nearly a quarter of a century of great changes in India. WILLIAM CHURCHILL.

Java, Sumatra and the Other Islands of the Dutch East Indies. By A. Cabaton. Translated and with a Preface by Bernard Miall. xvi and 376 pp. Map, 47 ills. and index. Charles Scribner's Sons, New York, 1911. 9 x 6.

Very nearly a third of this volume is taken up with Java, a chapter apiece being allotted to Sumatra, Borneo, Celebes, the Moluccas and Timor. This is quite in accord with the plan of the work, for it is a monograph on the economic geography of the Dutch East Indies, and in that empire Java is paramount in commerce and administration. The introductory sketch of the discovery and varied political history of Java is brilliantly linked with the economic problems rooted therein which have tended to retard the development of the East Indies as an appendage of the crown of the Netherlands. In connection with this theme it is gratifying to find that Prof. Cabaton gives his true rank to Douwes Dekker, who raised a voice of protest to which the mother land long gave no heed. The author proves a very sympathetic observer of the great question which Holland must solve, the adjustment of the position of the Javanese in respect of their relation to the metropolitan government on the one hand and on the other to the servile class of other Asiatics by whom they are surrounded in their own home. He recognizes that it is not going to be easy to correct the errors of the stupid past nor wise to admit an undeveloped people to the scheme of European education. Idle on their fields, yet intensely proud of their race and its past, the ambition of the Javanese is to go to school and to enter the professions; Holland need look no farther than to British India to discover what a plague may lie in the standards of the higher education. The store of material information contained in this volume will make it the authority for the general student. Prof. Cabaton has suffered uniformly at the hands of his translator; the sense is accurately rendered, but the clarity of style which marks the diction of the French text is lost. However, this may be regarded as, to a certain extent, offset by the excellent illustrations which have been added to the English edition. The translator has prefaced the work with a general chapter of his own which lacks somewhat of accuracy; still, even were it correct in each detail, this is wine that needs no bush. WILLIAM CHURCHILL.

EUROPE

The Russian People. By Maurice Baring. xix and 366 pp. 4 maps and index. George H. Doran Company, New York, 1911. $3.50. 8½ x 6.

Mr. Baring makes it plain that he is combating a Russia of fiction and the imagination. This is the Russia of the "Danicheffs" and of "Michael Strogoff," the Russia of the Third Section and the knout and the half-shaved convict train dragging bloody chains across the snowy steppes. Yet this false Russia is the real Russia for most of the world. What terror would be left to the knout if it were recognized as no more than the whip on the dashboard of every democrat wagon creaking to church along our New England highways? Mr. Baring has made a telling point in pointing out the falsity of the known Russia, and from this beginning he leads us pleasantly to an unknown Russia well worth knowing. Others have done something of this sort; we recall with pleasure a volume by Miss Hapgood a score of years ago. But the impression the predecessors have made was less, they told interesting truth and were not believed. The fault was that they neglected to take cognizance of the real and vital fact that all their readers were filled with belief in the false Russia. It is that which will give Mr. Baring's book its present and future position, that is on the assumption that stupid folk can be laughed out of their obsession. It may be that by his pleasant satire he may convert a few readers to the knowledge that there is really a Russia worth study. WILLIAM CHURCHILL.

The Building of the British Isles. Being a History of the Construction and Geographical Evolution of the British Region. By A. J. Jukes-Browne. Third Edition. xv and 470 pp. Maps,* ills. and index. Edward Stanford, London, 1911. 12s. 8 x 5½.

A new edition of this book, after a lapse of eighteen years, is most desirable. It presents in compact form a vast amount of information as to the geology of the British Isles. It is scarcely a book for general reading, as its closely printed pages contain a great number of details which cannot easily be held in mind; but as a book of reference, or for the special student of British geology, it is invaluable. On the title-page it is announced as "being a history of the construction and geographical evolution of the British region." The student of geography, however, is likely to be slightly disappointed. The volume is practically pure geology. To be sure the present form of the land is comprehensible only in the light of its past history, and hence the book is of primary importance in the study of the geography of England. As understood by the author, however, the term geography has a decidedly limited meaning. To him it designates little save the distribution of land and sea; he pays almost no heed to questions of relief or climate.

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* Listed in *Bull.*, Vol. 43, 1911, pp. 958–959.

The method of the volume is quite uniform. The geological periods are taken up in chronological sequence. Under each main division the stratigraphical evidence is first treated and numerous descriptions of the rock series are given. Then comes a section devoted to the physical geography of the period, rarely anything more than a description of the probable location of the old shore lines. If faulting or folding has taken place, the exact nature and location of the movements is carefully discussed.

Throughout the volume the reader who is abreast of modern geological thought is apt to feel that there is a good deal of conservatism. For instance, conglomerates are treated as if they were almost universally beach formations, whereas there is a growing body of evidence to show that in many, and perhaps the majority of cases, they are sub-aerial formations laid down in semi-arid regions, or at the base of mountains in more humid districts. In the same way the colors of rocks and their frequent changes in texture are rarely used as aids in determining the climatic or other variations which occurred during deposition. The Triassic period is now supposed by many to have been a time of extensive deserts; nevertheless, the author makes only a bare reference to these new views. Another of the points wherein he holds to the old interpretations is in the matter of peneplains. He considers that most of them are due to submarine erosion.

Other instances of the relatively conservative tone of the volume might be mentioned, but enough has been said to show its general character. Mr. Jukes-Browne is everywhere fair in his statement of the views of those who disagree from him. Almost invariably where two or more theories stand in opposition the one which the author does not accept is at least mentioned Thus, while the information given is not usually sufficient to enable the reader to judge fully of the merits of the case, he is at least put on his guard. Taken all in all the conservative tone of the book is of small importance, even for the most progressive reader, when compared with the great amount of most valuable information which Mr. Jukes-Browne has so ably collected from a multitude of sources.

ELLSWORTH HUNTINGTON.

La Loire: Étude de Fleuve. Par L. Gallouédec. 347 pp. Maps, ills. Librairie Hachette et Cie., Paris, 1910. Fr. 7.50.

Of all the large rivers of France, the Loire is certainly that whose geographical rôle has been most acutely influenced by the changes of historical conditions. As the river which traverses the heart of the country in almost its entire width, it was naturally predetermined to become the main artery of life for that country. In the times of ancient Gaul, when there were no land roads, it was indeed the "moving highway" for the tribes along its banks, but at the same time, owing to the difficulties which the width and the strong currents caused in crossing the river, it acted also as a barrier between those on both banks. At the time of the Roman Conquest, when land travel developed, roads were built as far as waterways were not available; but on reaching the river the road ended and travel continued downstream, even then crossing the river but in exceptional cases.

These two functions of the river, together with the two historical periods, are reflected in the oldest settlements of the Loire valley. The former is represented by the small harbor towns and villages lined up along the river at short intervals; they indicate the ancient landings of the small craft of old Gaul, and they are always located on the higher bank above high water level. The others are cities of Roman origin, such as Roanne, Digoin, Decize, Nevers, Orléans, Blois, Tours, Nantes, and mark the spots where a Roman highway reached the river. This location made them prosperous; they soon became important centers commercially, politically, and intellectually, so that the mention of some of these names evokes some of the proudest memories of mediæval France. This renders more striking the present aspect of these places in which everything speaks of a grandeur that is past but nothing of the present, and whose most modern piers and warehouses, much too large for the business which they accommodate, date from the eighteenth century.

The explanation of this decay is, that in proportion as land travel improved and increased the drawbacks of this capricious waterway made themselves felt more keenly. Even the discomforts of the mail coach, according to Mme. de Sévigné, seemed more bearable than those of the river, and thus the court left the banks of the Loire for those of the Seine, and passenger and freight traffic, too, gradually deserted it until the advent of the steam cars dealt the last and deadly blow to the sloops.

It is this process of historical development which must be made mainly responsible for the present condition of the Loire country, much more than the pretended deterioration of the waterway itself, which has been much exaggerated. Generally speaking, the river is as good—or as bad—as it ever was; the main trouble is that transportation by land has improved. In competition with the old highways the river could hold its own; it cannot, with modern roads. In recognition of this fact the author has undertaken the meritorious task of working up the existing observations on that river into an all-sided monograph, studying the relief, soil, and climate, of the Loire basin, the course of the river, its water-supply, floods, sands, ices, and the characteristics of its tributaries. In this way he has ascertained that the dangerous and unreliable character of the river is due to natural causes, namely, to the fact that the Loire enjoys, among the rivers of France, the fatal distinction of receiving all its principal tributaries from the same region, the Central Plateau. In other rivers whose tributaries come from various parts of the country and are also better distributed along their courses, a flood or drought in the basin of one of them may be balanced by the opposite condition of another so that neither becomes too great in the main river. But in the case of the Loire all the principal branches act simultaneously in filling or emptying its bed, so that its floods must needs become more devastating, and its shallows more shallow, than those of any other river.

As this condition cannot be allowed to last, the author strongly pleads for a regulation of, at least, the part of the river between Nantes and Orléans or Briare. A navigable waterway of that length, establishing a connection between the 1,100 kilometers of waterways of the Loire system and the great canal system of France, would be the only means to re-awaken that beautiful country from the deadly sleep of its present condition. MARTHA KRUG GENTHE.

POLAR

Les Expéditions Polaires depuis 1800. Liste des états-majors nautiques et scientifiques. Par Jean Denucé. 159 pp. Index. Imprimerie J. van Hille-de Backer, Anvers, 1911. 10 x 6½.

An expansion and a partial correction of the provisional list of expeditions in the polar regions prepared by the author for the International Polar Congress which met in 1908 at Brussels. The arrangement of the list is chronological under each of the countries engaged in the work, the first part of the book containing the Antarctic record and the second part the Arctic. As far as possible the date, the vessel, the object of the expedition, the names of the officers and scientists of each party are given. The task is a large one and it is not strange that even a second edition contains many errors. In the American list, for instance, the leader of the 1861-62 expedition is given as Francis Charles Hall, the names of the captains of the vessels in Wilkes's fleet do not agree with Greely's list, the expeditions of Leonidas Hubbard, Jr., and Mrs. Hubbard in Labrador are entered, but Wallace's expedition is not included, and in Peary's 1905-6 expedition appears the name of J. Ross Marvin, while in Peary's 1908-9 expedition, E. Ross Marvin. R. M. Brown.

EDUCATIONAL GEOGRAPHY

Commercial Geography. A Book for High Schools, Commercial Courses, and Business Colleges. By Jacques W. Redway, F.R.G.S. viii and 408 pp. Maps, illustrations and index. Charles Scribner's Sons, New York, 1910. 7½ x 5½.

This book, a new edition, contains thirty-nine chapters, of which two are given to general principles, one each to climate and topography, two to transportation, one to cities, nine to commercial products, three to the United States, and the remaining chapters to the rest of the commercial world. An analysis of the chapter contents shows that the author's object is factual. But little attempt is made to correlate the facts of commerce and manufactures with the reasons, either geographic or economic, for those facts. The chapters on the underlying factors of climate, topography, economics and sociology are short and incomplete and are evidently not considered very important in the treatment. The style is clear, readable, interesting. Useful review topics and well-chosen illustrations add to the value of the book. It seems doubtful, however, if this class of text books brings out the great possibilities of the subject in the school room, when the separate items are given without adequate consideration of fundamental principles. F. V. Emerson.

Climatic Control. (Black's School Geography.) By L. C. W. Bonacina. viii and 167 pp. Maps, ills., index. Adam & Charles Black, London, 1911. 2s. 7 x 5.

A pleasantly written, rather superficial but interesting little book. The author realizes the breadth of his subject, and frankly says in his preface that he has only tried to prepare "a guide to help the student to observe and think for himself." The principles of climatology are first discussed, after which comes a description of the various "types of land in relation to climate," such as equatorial forests, tropical grass-lands, monsoon belts, sand deserts, the forests, grass lands and deserts of the temperate zones, polar snow deserts, and mountains. The climatic conditions of selected countries, "representative of the different regions of the earth," are then considered, and here we have brief accounts of the climates of the British Isles, Russia, Italy, Egypt, Brazil and Greenland. Special attention is paid to the British Isles, and many smaller relations of climate and man are brought out. The influence of climate upon man is considered in three chapters, but instead of treating this subject under the zones, or under different types of climate, our author takes it up under indoor life, outdoor life, and race and nationality. Most of the illustrations of climatic control are very familiar, and we cannot help feeling that several of them are far-fetched. For example (p. 113), in speaking of an Alpine valley which opens towards the north, the author says that it "is entirely cut off from the direct rays of the sun, with the consequence that a hideous disease called cretinism lurks among its inhabitants." We have never heard that cretinism was due to lack of sunshine. In his consideration of the influence of climate upon the color of the skin, and upon other physical and mental characteristics, our author touches upon many matters of active controversy with a very strong leaning on his part in favor of the climatic control. Curiously placed, at the end of the book, comes a chapter on meteorology, which seems to us quite out of place there. We feel sure that Mr. Bonacina's little volume will find a good number of readers, and that it will do its work well in directing attention, in an interesting way, to the importance of our climatic environment.

R. DeC. Ward.

PHYSICAL GEOGRAPHY

Physik der Erde. Von Prof. M. P. Rudzki. viii and 584 pp. 60 text figures and 5 plates. Chr. Herm. Tauchnitz, Leipzig, 1911. M. 14. 9½ x 6.

Students of geophysics will welcome this comprehensive work, which presents the results of the physical and mathematical studies of earth problems, and in a form, as far as possible, intelligible to the non-mathematical though scientific reader. In a good many chapters a knowledge of the differential and integral calculus is indeed assumed, but Prof. Rudzki shows an exceptional facility in stripping his subject of non-essentials and so laying the outlines clearly before the reader. Excepting only the subjects of earth magnetism and meteorology, the attempt has been made to cover the entire field of earth physics.

The author of this comprehensive work is Director of the Astronomical Observatory at Cracow and holds the unusual title of Professor of Physical Geography and Astronomy in the University at that place. The book is the author's German translation of his own work originally published in Polish two years earlier.

The figure of the earth he treats at considerable length in three chapters (100 pages) which are admirably clear summaries of the various calculations upon the form of the geoid, based upon gravity and geodetic measurements. It is a little remarkable that no mention should be made of the earth's departure from the spheroidal toward the modified tetrahedral figure, as clearly indicated by the distribution of ocean and continent, the disposition of ancient land masses, etc. In discussing the rigidity of the planet, though the tidal argument is given with much fullness, that based upon earthquake waves, and Kelvin's argument from continued rotation are not taken up.

The rôle of radium in modifying the effect of secular cooling Rudzki believes to be so great as probably to mask completely the loss of heat from radiation, though admitting that the time has not yet come for a definite pronouncement. He thus places himself upon the side of Joly and as against the views of Strutt that only the earth's shell to a depth of about 72 kilometers contains radium.

The appearance of this work of a mathematician with a more or less general assumption of authority, makes it pertinent to comment upon the manner in which its conclusions should be received. The name "exact sciences" as applied to those which make use of the mathematical method, is with little doubt responsible for some misconception concerning the degree of confidence which should be reposed in conclusions within their field; for though the methods may be exact and unimpeachable, it has been notably true that mathematical investigations in the field of earth science have been based upon assumptions that are often largely gratuitous. In part this has been explained by the large scales employed, but very largely it is accounted for by the fact that the worker is far removed from the observational method which in other fields has become the dominant note of modern science. It is not so long since Lord Kelvin, with perhaps a pardonable arrogance, assured the geologist that exact mathematical calculations based upon the rate of secular cooling of the earth had made the geologists' assumptions concerning the length of geological time quite absurd. At the recent Winnipeg meeting of the British Association Sir J. J. Thomson, who had still further reduced the geologists' allowance of time, admitted in his Presidential address for the fraternity of the mathematicians that Kelvin's assertion must now be withdrawn.

To-day a new and equally insistent demand has been made by the mathematician upon the basis of extended geodetic observations interpreted to prove that the earth's outer shell is perfectly plastic and in complete adjustment above a quite definite spherical surface of compensation. This claim of Hayford, when modified by other assumptions suggested by Chamberlin, doubled the depth of the surface of compensation, and it has recently been shown by Lewis that Hayford's values depend upon a quite unwarranted assumption that within the outer shell of the earth compensation is complete. Hayford's studies in large part, and those of Hecker which have been interpreted to confirm them, do not deal directly with variations in the value of gravity, but with deflections of the vertical only. The haste with which some geologists have accepted these conclusions, suggests that more attention has been fixed upon the number and the precision of the measurements than upon the somewhat sweeping assumptions that have been coupled with them. It is because Prof. Rudzki has quoted these results with so much approval, and because Lewis's paper had not appeared at the time the "Physik der Erde" was published that these comments are necessary.

Discussing isostasy in especial relation to areas of erosion and deposition with use of Airy's assumptions, Rudzki concludes that if earth density increases with depth, isostatic sinking within areas of deposition, and elevation within areas of denudation, must come to an end. Thus despite isostatic stress an eroded upland should be reduced to a plain.

Upon the assumption that the amount of water upon the globe has remained constant, and using figures from the measure of the post-Pleistocene elevation of northern glaciated areas in connection with those for the dimensions of existing Arctic glaciers, it is derived that the maximum local thickness of the Pleistocene continental glaciers was about 1667 meters.

Professor Rudzki's application of mechanics to the problems of Alpine folding and especially to the hypothesized *nappes de charriage* will be read with especial interest, since it had before been claimed that these ingenious explanations of the observed conditions are mechanically impossible. Willis's recent discovery of a simple and more rational explanation in two systems of thrusts which have come from opposite quarters, will tend to emphasize the already existing doubt concerning the Swiss structures, which doubt Rudzki echoes.

A few only of the subjects treated in Professor Rudzki's book can be referred to in a review like the present. As a work of reference and as a guide to the literature of the subject, it will be especially useful to geologists, and it is a volume of which account must be taken by all who are interested in those ultimate causes of earth changes which lie hidden behind the observed phenomena.

WILLIAM HERBERT HOBBS.

Aeronautische Meteorologie. Von Dr. Franz Linke. I. Teil: viii and 133 pp. Mit 43 Textabbildungen und 8 Tabellen. M. 3. II. Teil: viii and 126 pp. Mit 37 Textabbildungen und 7 farbigen Tafeln. M. 3,50. Verlag von Franz Benjamin Auffarth, Frankfurt a.M., 1911. 9½ x 6 each.

These volumes were written as a meteorological text book for air navigators whether traveling by free balloon or one of the various types of dirigibles. The important influence of the air conditions upon such flights created a demand for an explanatory work dealing, as simply as possible, with the science of meteorology and the instruments and methods used in observational work, with a special view to the needs of air travelers. The work has already been highly approved in Germany for its practicability in the hands of aeronauts.

MATHEMATICAL GEOGRAPHY

Hydrographic Surveying: Elementary. For Beginners, Seamen and Others. By Commander Stuart. V.S.C. Messum. xiv and 504 pp. Maps, illustrations, appendices and index. Charles Griffin & Co., Ltd., 1910. $3.75. 8 x 5½.

In the preface the author says that this book is intended as a guide to all those whose duty it is intelligently and correctly to report to the proper authorities the changes that are occurring in the harbors and rivers and to those who wish to carry out some original work. Part I describes the instruments used for the work, and, in this section, the book does not differ materially from other books on surveying. Part II has three brief chapters and discusses the essential and usual appurtenances of a map. This includes the description of two projections, the gnomonic and the Mercator, scale and legend. This is the weakest portion of the book, partly from the manner of presentation and partly because the application of the material, which is limited wholly to the needs of the work, is not evident at this point. The third part is headed Practical Construction and is the main portion of the text. Here is described the process of surveying by triangulation, the fixing of the coast line, the surveying of a river-mouth, sounding and locating shoals. This is illustrated by many examples and a number of plates are inserted to show the different stages of the work. An extensive list of appendices furnish additional information for the student. The book is intended for beginners but the text matter pre-supposes a knowledge of plane and spherical trigonometry.

R. M. BROWN.

GENERAL

The Periplus of the Erythraean Sea. Travel and Trade in the Indian Ocean, by a Merchant of the First Century. Translated from the Greek and Annotated by Wilfred H. Schoff, A.M., Secretary of the Commercial Museum, Philadelphia. 323 pp. Maps, ills. and index. Longmans, Green & Co., New York, 1912. $2. 6 x 9½.

In the "Foreword" with which Dr. W. P. Wilson introduces Mr. Schoff's volume he informs us that "When the history of commerce from its earliest dawn to its present tremendous international proportions shall be carefully written, the Periplus will furnish a most interesting part of such early history, and the Commercial Museum will not have to apologize for rescuing this work from obscurity and presenting it to the general public." These sentiments, and the grammar in which they are expressed, will prepare the reader for a genuinely up-to-date treatment of a work which has hitherto been known only to scholars. Accordingly we find, on one of the earliest pages, that the title of a modern Greek commentary has been transliterated into characters which make it resemble Bantu, and that the famous port of Myoshormos appears as "Mussel Harbor" which will agreeably recall summer holidays on the coast of Maine. We are almost surprised not to find Atlantic City in the list of settlements on the East Coast of Africa and are inclined to reproach the Editor for leaving the name of Philadelphia in its Hellenic crudity on the title-page.

The historical introduction of 16 pages is followed by a bibliography in which the several editions of Vincent's great work are hopelessly confused, though the author praises them in generous terms. The translation occupies 28 pages, after which there are 245 pages of notes and a full index.

To produce a readable English version should not be hard for a student who has at his disposal translations in English, German, Italian, and Latin to aid him in interpreting the crabbed Greek of the anonymous author. Mr. Schoff follows the original fairly closely, though without that respect for the finesse of Greek Grammar which a rigorous examiner would demand in the schools. He uses Müller's text with occasional emendations from Fabricius, but as he does not state precisely where these emendations occur he is protected from any criticism of his renderings by those who do not happen to possess both editions.

The principal value of Mr. Schoff's work is in the notes, which evince industrious and wide reading. It is inexcusable, however, that he should have neglected the opportunities which were at his very door in Philadelphia for studying the history and archæology of Egypt and Nubia. To speak of Nubia as having been "a center of culture and prosperity *under the Byzantine Empire*" is making history in a very new and undesirable sense. Again, the facile touch with which he treats African ethnology will hardly impress those who have devoted any study to the subject, and archæologists will do well to skip the notes on such subjects as iron, bronze and glass. But when discussing the history of plants and manufactures Mr. Schoff is evidently on more familiar ground, and these parts of his book will be read with much interest. We owe him also some gratitude for collecting in an available form so many identifications of places and peoples from authors whose works, unlike the Periplus itself, are not in every well-equipped library.

DAVID RANDALL-MACIVER.

Journals and Reminiscences of James Douglas, M.D. Edited by his Son. 254 pp. and ills. Privately printed, New York, 1910. 9 x 6.

A sketch of the life of an unusual man who came in with the nineteenth century and lived till its eighty-sixth year. Born in England, Dr. Douglas made an eventful whaling voyage to Spitzbergen in 1818, later spent a year in India, was in medical charge of an ill-fated colonizing experiment in Honduras, lived for a short time at Utica, New York, where he married, and spent the larger part of his life in Quebec, where he died. A man of large experience, wide travel and acute observation, his book contains many graphic word pictures of men and things all over the world and much of interest from a geographical point of view.

Beasts and Men. Being Carl Hagenbeck's Experiences for Half a Century Among Wild Animals. An Abridged Translation by Hugh S. R. Elliot and A. G. Thacker. With an Introduction by P. Chalmers Mitchell. xi and 299 pp. 100 ills. and index. Longmans, Green & Co., New York, 1911. $2. 9½ x 7.

The book gives an account of the life of a collector of animals and much interesting information concerning the animals themselves. The story of the growth of the business from an exhibition of seals in a tub at his father's house to the pretentious animal park at Stellingen is told attractively. The various ways of capturing animals are described, and there are chapters on the different kinds of animals as carnivores, herbivores, reptiles, ostriches and anthropoid apes. In the chapter on animal training, Mr. Hagenbeck explains his method of teaching his captives to perform, and it is to be hoped, as Mr. Hagenbeck prophesies, that his procedure will displace the older and cruel method of instilling fear. Many personal experiences in the handling of wild animals show some of the difficulties of collectors and many traits of wild life. Though the price of the book has been reduced from $3.50 the quality of production is maintained.

R. M. Brown.

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NEW MAPS

Edited by the Assistant Editor

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Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

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Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

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Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

Maps issued by United States Government Bureaus

U. S. Coast and Geodetic Survey.

[N. B. Limiting coordinates given only for charts not listed in the Coast and Geodetic Survey "Catalog of Charts, Coast Pilots and Tide Tables. 1911."]

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Penobscot Bay, Maine. 1:80,000. Chart No. 104. June 1911. 50 cts.
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San Juan Harbor, Porto Rico. 1:10,000. Chart No. 908. Sept. 1911. 50 cts.

Pacific Coast.

San Diego to Bering Sea, West Coast [of] North America. Mercator's Projection: equatorial scale 1:7,420,000. 60°35′ - 31°50′ N.; 173°0′ - 116°25′ W. 2 colors. Chart U. Dec. 1911. 50 cts.

Los Angeles Harbor and Vicinity, California. 1:40,000. Chart No. 5143. Nov. 1911. 25 cts.

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Greenwood to Fort Bragg, California. 1:40,000. 39°30′ - 39°7′ N.; 123°56′ - 123°38′ W. With two insets: (1) Fort Bragg Landing. 1:10,000. 39°26.5′ N. and 123°49′ W. (2) Approaches to Albion. 1:10,000. 39°13.5′ N. and 123°46.5′ W. Chart No. 5703. Nov. 1911. 50 cts.

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Harbors in Dixon Entrance and Clarence Strait, Southeast Alaska. [Six charts, viz.:] (1) Port Chester. 1:20,000. (2) Port Tongass. 1:10,000. (3) Cape Chacon and Vicinity. 1:80,000. (4) Tamgas Harbor. 1:40.000. (5) Chasina Anchorage. 1:10,000 (6) Niblack Anchorage. 1:20,000. Chart No. 8074. July 1911. 25 cts.

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Western Entrance [of] Prince William Sound, Alaska. Preliminary Chart. 1:80,000. Chart No. 8595. Sept. 1911. 50 cts.

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Port Moller and Herendeen Bay, West Coast of Alaska. [1:80,000]. Chart No. 8833. July 1911. 25 cts.

Hawaiian Islands.

Hawaii. 1:216,000. 20°49′ - 18°36′ N. ; 156°35′ - 154°32′ W. 2 colors. Chart No. 4115. Aug. 1911. 50 cts.

Philippine Islands.

Northern Part [of] Philippine Islands: Manila Bay to Formosa. [Mercator's Projection: equatorial scale 1:810,000]. 21°56′ - 14°22′ N. ; 118°38′ - 123°40′ E. Chart No. 4705. Oct. 1911. 50 cts.

Masbate and Northern Samar, Southeastern Luzon. [1:397,000]. Chart No. 4715. Oct. 1911. 50 cts.

Palawan. [1:400,000]. Chart No. 4716. Sept. 1911. 50 cts.

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Mindoro and Vicinity. [Mercator's Projection: equatorial scale 1:204,000]. 13°40′ - 11°45′ N.; 120°15′ - 121°45′ E. Chart No. 4305. Dec. 1911. 50 cts.

Anchorages, Southeastern Mindoro and Tablas I. [Three charts, viz. :] (1) Buruncan Point to Pocanil Bay, Southeast Coast of Mindoro. 1:40,000. 12°20.2′ - 12°11.0′ N. ; 121°14.5′ - 121°28.0′ E. 1 color. (2) Looc Bay, West Coast of Tablas. 1:40,000. 12°15′ N. and 121°59′ E. 1 color. (3) Lagara Cove and Passes southward, Southeast Coast of Mindoro. 1:20,000. 12°17′ N. and 121°23′ E. 1 color. Chart No. 4339. Jan. 1912. 30 cts.

Harbors on the Coast of Masbate. [Four charts, viz :] (1) Port Barrera, Northeast Coast of Masbate. 1:30,000. 12°33′ N. and 122°22′ E. (2) Port Cataingan, East Coast of Masbate. 1:30,000. 12°0′ N. and 124°0′ E. (3) Masbate Harbor, Northeast Coast of Masbate. 1:20,000. 12°23′ N. and 123°37′ E. (4) Nin Bay and Port Mandaon. 1:30,000. 12°10′ N. and 123°13′ E. Chart No. 4455. Oct. 1911. 30 cts.

Port Palapag and Laoang Bay, North Coast of Samar. 1:40,000. With inset: Continuation of Catubig River to Catubig. Chart No. 4449. Sept. 1911. 30 cts.

Harbors in Cebu. [Eleven charts, viz. :] (1) Hagnaya Bay, Northwest Coast of Cebu. 1:30,000. 11°7′ N. and 123°57′ E. (2) Tuburan, Northwest Coast of Cebu. 1:30,000. 10°44′ N. and 123°49′ E. (3) Balamban Bay, West Coast of Cebu 1:30,000. 10°30′ N. and 123°42′ E. (4) Barili Bay, West Coast of Cebu. 1:15,000. 10°7.5′ N. and 123°29.5′ E. (5) Lambusan, Northeast Coast of Cebu. 1:30,000. 11°0′ N and 123°55′ E. (6) Dumanjug Bay, West Coast of Cebu. 1:20,000. 10°4′ N. and 123°26′ E. (7) Moalbual, West Coast of Cebu. 1:20,000. 9°56′ N. and 122°23′ E. (8) Argao, Southeast Coast of Cebu. 1:25,000 9°53′ N. and 123°36′ E. (9) Bogo Bay, Northeast Coast of Cebu. 1:30,000. 11°5′ N. and 124°1′ E. (10) Carcar Bay, Southeast Coast of Cebu. 1:15,000. 10°5′ N. and 123°39′ E. (11) Port Carmen, East Coast of Cebu. 1:15,000. 10°35′ N. and 124°2′ E. Chart No. 4465. Jan. 1912. 30 cts.

Harbors in Cebu and Negros. 1 color. [Nine charts, viz. :] (1) Dumanjug Bay, West Coast of Cebu. 1:20,000. 10°4′ N. and 123°26′ E. (2) Balamban Bay, West Coast of Cebu. 1:30,000. 10°30′ N. and 123°42′ E. (3) Dumaguete, Southeast Coast of Negros. 1:10,000. 9°18′ N. and 123°19′ E. (4) Port Canoan, Siquijor Island. 1:5,000. 9°15′ N. and 123°36′ E. (5) Tinaan Anchorage, East Coast of Cebu. 1:35,000. 10°11′ N. and 123°45′ E. (6) Bais, East Coast of Negros. 1:30,000. 9°36′ N. and 123°9′ E. (7) Bogo Bay, Northeast Coast of Cebu. 1:30,000. 11°5′ N. and 124°1′ E. (8) Barili Bay, West Coast of Cebu. 1:15,000. 10°7.5′ N. and 123°29.5′ E. (9) Jimamaylan, West Coast of Negros. 1:20,000. 10°5′ N. and 122°52′ E. Chart No. 4458. Oct. 1910. 30 cts.

Southern Part [of] Tañon Strait, Negros and Cebu. 1:100,000. 10°8′ - 9°12′ N. ; 123°5′ - 123°46′ E. 1 color. Chart No. 4430. Oct. 1911. 40 cts.

Western Bohol. 1:100,000. 10°22′ - 9°23′ N. ; 123°36′ - 124°16′ E. 2 colors. Chart No. 4429. Nov. 1911. 40 cts.

Iligan Bay and Vicinity. [Mercator's Projection: equatorial scale 1:200,000]. 9°23.8′ - 8°1.0′ N. ; 123°7′ - 124°58′ E. 2 colors. Chart No. 4604. Oct. 1911. 50 cts.

Anchorages in Iligan Bay and Vicinity, North Coast of Mindanao. 1 color. [Eight charts, viz. :] (1) Langaran and Inamucan Bay. 1:25,000. 8°37′ N. and 123°43′ E. (2) Canauayor Anch. 1:20,000. [illegible]5′ N. and 124°5.5′ E. (3) Oroquieta. 1:20,000. [illegible]′ N. and 123°48′ E. (4) Jimenez. 1:20,000. 8°21′ N. and 123°51′ E. (5) Port Mambajao, Camiguin Island. 1:10,000. 9°15.5′ N. and 124°43.0′ E. (6) Dapitan and Dipolog. 1:40,000. 8°40′ N. and 123°22′ E. (7) Iligan and Overton Anchorages and Quinalang Cove. 1:40,000. 8°14′ N. and 124°14′ E. (8) Cagayan Anch. 1:20,000. 8°30′ N. and 124°39′ E. Chart No. 4639. Oct. 1911. 30 cts.

[Two charts, viz. :] (1) Agusan River Entrance, North Coast of Mindanao. 1:20,000. (2) Nasipit Harbor, North Coast of Mindanao. 1:15,000. Chart No. 4647. Sept. 1911. 30 cts.

Jolo Island and Vicinity. 1:189,000. Chart No. 4542. Dec. 1911. 30 cts.

NORTH AMERICA.

UNITED STATES.

DELAWARE. Chart of Leased Oyster Bottoms, Delaware Bay, State of Delaware. Surveyed by Delaware Oyster Survey Commission. 1910. 1:20,000. 39°11′40° - 39°2′50° N.; 75°26′ - 75°11′ W.

CENTRAL AMERICA AND WEST INDIES.

THE GREATER ANTILLES, FLORIDA, YUCATAN. Amérique 1,000,000e. État d'avancement des travaux au 31 Décembre 1909. [1:13,300,000]. 32° - 16° N.; 93⅔° - 63⅔° W. 2 colors. Taf. 9, *Pet. Mitt.*, Vol. 57, II, July, 1911.

[A copy of the index map of the map of "America," 1:1,000,000, issued by the Service Géographique de l'Armée of France. Originally published as Pl. XV of its report for 1909. The map includes the southern parts of Louisiana, Mississippi, Alabama and Georgia and the whole of Florida. As the sheets covering Florida south of 28° N. are among those already published the interesting condition results that this part of the United States has been represented cartographically on the scale of the International Map of the World by a foreign government sooner than by our own.]

AFRICA.

Belgian Congo—Uganda—German East Africa. Ethnographische Übersichtskarte des Nil-Kongo-Zwischengebietes bearbeitet von Dr. Jan Czekanowski. 1:1,500,000. 6° N. - 30° S.; 23° - 33° E. 37 colors. Taf. 11, "Ethnographie des Nil-Kongo-Zwischengebietes" by J. Czekanowski, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 22–25.

[Highly important map of the region of ethnographic contact between the Sudan and the Bantu negroes, based on the investigations of the author while a member of the Duke of Mecklenburg's expedition to Central Africa. The map presents an accurate delineation not alone of the ethnography but also of the topography of the district. Thirty-five tribal divisions are recognized. Relief is repsented in approximate contours in black. The authorities used are cited in the text.]

Ivory Coast. (a) Colonne du Yaro. Carte dréssée sous la direction du Chef de B'on Bordeaux, par le Lieut't Ferrand, Jean, de l'Inf'ie Coloniale, d'après les itinéraires des officiers ayant pris part à la Colonne. [1:600,000]. [7°18′ - 6°26′ N.; 7°40′ - 7°10′ W.] With inset showing general location.

(b) Colonne du Haut-Bandama. [1:1,400,000]. [8°0′ - 6°30′ N.; 6°10′ - 4°40′ W.]. With inset showing general location.

Accompany "La Pacification de la Cote d'Ivoire," by A. Terrier, *Renseign. Colon.*, No. 12, 1911, pp. 293–300.

[Valuable military surveys of hitherto unexplored territory].

Morocco. Secteur Rabat-Salé d'après la carte du bureau topographique des troupes débarquées au Maroc. [1:975,000]. [34°40′ - 33°30′ N.; 6°55′ - 5°30′ W.]. Accompanies "En Colonne chez les Zaërs" by A. de Montalembert, *Renseign. Colon.*, No. 12, 1911, pp. 314–317.

Tripolitania. Der italienisch-türkische Kriegsschauplatz in Tripolis. [Three maps:] (a) Das Operationsgebeit im nordwestlichen Tripolitanien um Tripolis, Homs (Lebda) und Mesrata bis an den Fuss des Djebel Nefusa. 1:750,000. 33°5′ - 31°50′ N.; 11°50′ - 15°30′ E. 5 colors.

(b) Plan von Tripolis und seiner Oasen mit den Befestigungen, Kasernen und Brunnen. 1:25,000. [32°54′ N. and 13°11′ E.]. 8 colors.

(c) Plan von Bengasi. 1:50,000. [32°7′ N. and 20°4 E.]. 6 colors.

Taf. 49, "Die Militärgeographie des tripolitanischen Hinterlandes" by Hübner, *Pet. Mitt*, Vol. 57, II, Dec., 1911, pp. 361–363.

[Valuable maps because of their relatively large scale. On map (a) special symbol for cultivated land, on map (b) separate symbols for cultivated fields and date groves. On map (a) Italian orthography of *jebel* [gebel] retained although French version given in title].

Tripolitania. Carta della Tripolitania e Cirenaica. Achille Dardano dis. 1:500,000. 42° - 20⅔° N.; 6° - 28° E. 7 colors. With two insets: (a) Tripolitania Settentrionale. 1:2,000,000. 33¼° - 31° N.; 11½° - 15½° E. 6 colors. (b) Cirenaica. 1:2,000,000. 33¼° - 31° N.; 19½° - 24⅙° E. 5 colors. Accompanies *Rivista Coloniale*, Vol. 2 (Anno VI, Series II), Nos. 19-20, Rome, 1911.

[A valuable general map on a larger scale than usually accessible. In execution representative of the high standards of the Istituto Geografico de Agostini. Distinction is made between (1) cultivated regions and oases, (2) steppes, (3) rock deserts (*hammáda*, *serîr*), (4) sand deserts (*erg*).

ASIA.

Chinese Empire. Aufstandsgebiete und europäische Interessen in China. 1:5,000,000. 44° - 21° N.; 95° - 131° E. (Ausschnitt aus Langhans' Karte der Chinesischen Revolution). 7 colors. Taf. 15, "Militärgeographische Orientierung auf dem Schauplatz der Chinesischen Revolutionskämpfe" by T. v. Trotha, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 63–64.

[Photographic enlargement of relevant sheets in Stielers Hand-Atlas. Regions affected by the revolution and railroad lines shown in red].

Chinese Empire—India. Der lezte Teil des Reisewegs der Anfang Januar 1909 am mittleren Salween in Britisch-Burma ermordeten Dr. Robert Brunhuber und Karl Schmitz. [In two parts:] (1) Übersicht der Reise von Dr. Brunhuber und Schmitz von Bhamo durch Jünnan nach Omati. 1:1,500,000. 30° - 24° N.; 97° - 101° E. 5 colors. (2) Sechs Reisetage von Dr. Brunhuber und Schmitz am mittleren Salween in Jünnan vom 8. bis 13. Dez. 1908. Nach den einzigen geretteten Tagebuchskizzen Brunhubers. 1:150,000. 26°10′ - 25°34′ N.; 98°45′ - 98°57′ E. 6 colors. Taf. 7, "Die Ergebnisse der Reise der ermordeten Dr. Brunhuber und Schmitz zum oberen Salween" (first part) by M. Hammer, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 19–22.

[Route survey compiled from the note books of the two ill-fated explorers. Cf. also map dealing with same subject, *Geogr. Journ.*, Vol. 34, 1909, p. 609, and map of Forrest and Litton's journey in the same region, *Geogr. Journ.*, Vol. 32, 1908, following p. 328].

Eastern Asia. Asie Orientale 1,000,000e. État d'avancement des travaux au 31 Décembre 1909. [1:18,000,000]. 48° - 12° N.; 98⅓° - 146⅓° E. 4 colors. Taf. 8, *Pet. Mitt.*, Vol. 57, II, July, 1911.

[A copy of the index map of the Map of Eastern Asia, 1:1,000,000, issued by the Service Géographique de l'Armée of France. Originally published as Pl. XIII of its report for 1909. Shows which sheets have been published and the extent of completion of those not yet published. Cf. second entry under "France," *Bull.*, Vol. 43, 1911, p. 551].

Persia, Afghanistan, Turkestan, Etc. Asie Centrale 1,000,000e. (Perse, Afghanistan et régions limitrophes). État d'avancement des travaux au 31 Décembre 1909. [1:7,600,000]. 44° - 20° N.; 44⅓° - 80⅓° E. 4 colors. Taf. 7, *Pet. Mitt.*, Vol. 57, II, July, 1911.

[Index map originally published as Pl. XIV of the report for 1909 of the Service Géographique de l'Armée of France. Cf. note under "Eastern Asia."]

Siberia. Die Samojedenhalbinsel (Ja-mal), (Westsiberien). Nach den Aufnahmen der Kais. Russ. Geogr. Gesellschaft 1908 unter Leitung von B. M. Shitkow. 1:1,750,000. 73°35′ - 66°0′ N.;

65° - 75° E. 3 colors. Taf. 3, "Die Erforschung der Samojedenhalbinsel (Jamal)" (first part) by B. M. Shitkow, *Pet. Mitt.*, Vol. 57, II, July, 1911, pp. 11-14.

[Valuable map embodying the results of the Russian Geographical Society's expedition in 1908 to this hitherto insufficiently surveyed peninsula. "Ja-mal" (in the English transliteration: Ya-mal), in contradistinction to "Yal-mal", the form in general use, is stated to be the correct rendering of the name (cf. second part of paper, *Pet. Mitt.*, Vol. 57, II, p. 71). The revised form of the name as well as the results of the above expedition appear on the Russian chart of the Gulfs of Obi and Yenisei, 1:1,000,000, listed in the *Bull.*, Vol. 43, 1911, p. 799.]

AUSTRALASIA AND OCEANIA

SAMOA. Die deutsche Samoa-Insel Apolima. Aufgenommen von Dr. Kurt Wegener, 1909. 1. Übersicht von Apolima. 1:25,000 approx. [13°4[illegible]′ S. and 172°0′ W.]. 3 colors. 2. Dorf und Lagune, 1909. 1:2,500 approx. 3 colors. Taf. 44, "Die deutsche Samoa-Insel Apolima" by K. Wegener, *Pet. Mitt.*, Vol. 57, II, Dec., 1911, pp. 322-324.

EUROPE

BULGARIA, TURKEY, ETC. Der Schauplatz eines zukünftigen türkisch-bulgarischen Konfliktes. 1:1,[illegible] 43°25′ - [illegible] N.; 21° [illegible] - [illegible] 15′ E. 5 colors. Taf. 10, "Der turkisch-bulgarische Kriegsschauplatz. Eine militärgeographische Studie" by O. Kreutzbruck v. Lilienfels, *Pet. Mitt.*, Vol. 57, II, July 1911, pp. 51-53.

[Photographic enlargement of the relevant sheets of Stieler's Hand-Atlas. Garrison towns specially marked.]

CENTRAL EUROPE. Übersicht der Neuausgabe von Vogels Karte des Deutschen Reichs mit der Erweiterung über die Alpenländer in 1:500,000. 1:15,000,000. [55½° - 45½° N.; 5° - 23° E.]. Accompanies "Zur geographischen Namenkunde Mitteleuropas: Einleitung zur Neuauflage von Vogels Karte des Deutschen Reichs und der Alpenländer" by L[anghans], *Pet. Mitt.*, Vol. 57, II, July, 1911, p. 1.

GERMANY. [Lageplan des Hunnenringes by Otzenhausen im südlichen Hunsrück]. 1:12,500. [49°36′ N. and 7°0′ E.]. Accompanies "Der 'Hunnenring' bei Otzenhausen im Hunsrück" by P. Seehaus, *Pet. Mitt.*, Vol. 57, II, July, 1911, p. 22.

GERMANY. Übersicht der Höhenschichtenkarte des Grossherzogthums Hessen im Massstabe von 1:25,000. 1:500,000. 50°54′ - 49°12′ N.; 7°50′ - 9°40′ E. Taf. 47, "Topographische Landesaufnahme des Grossherzogt. Hessen," *Pet. Mitt.*, Vol. 57, II, Dec., 1911, p. 351.

GERMANY. Übersicht der seit dem Jahre 1877 von der Königlich Preussischen Landesaufnahme im Massstabe 1:25,000 der naturlichen Länge veröffentlichten Messtischblätter. [1:1,000,000]. Blatt 1 [N. W. Prussia. 56° - 53° N.; 6⅓° - 14⅓° E.]. Blatt 2 [N. E. Prussia. 56° - 53° N.; 14⅓° - 23° E.]. Blatt 3 [S. W. Prussia. 53°0′ - 49°48′ N.; 5°50′ - 14°20′ E.]. Blatt 4 [S. E. Prussia. 53°0′ - 49°48 N.; 14⅓° - 19⅓° E.]. Blatt 5 [Alsace-Lorraine. 49°48′ - 47°12′ N.; 5°50′ - 10°30′ E.]. Taf. 14a-e, *Pet. Mitt.*, Vol. 58, I, Jan., 1912.

[Copy of the official index maps of the largest-scale government map of Prussia, the so-called plane table map in 1:25,000].

SWEDEN. (a) [Das nördliche Schweden zur Veranschaulichung der Lage der Eisenerzstätten zu den Ausfuhrhäfen]. [1:25,000,000]. [71° - 65° N.; 12° - 42° E.].

(b) Geologische Skizze der Umgebung von Kiruna nach H. Lundbohm. 1:1,000,000. [67⅞° N. and 20¼° E.].

Text map and Taf. 1, "Das schwedische Eisenerzlager Kiruna" by G. Greim, *Pet. Mitt.*, Vol. 57, II, July, 1911, pp. 4-8.

WORLD AND LARGER PARTS

WORLD. Karte der Grenzen und der Genauigkeit unserer heutigen Kenntnis vom Relief der Erdoberfläche entworfen und gezeichnet von Ludwig Carrière. (Grundlage: Berghaus' Physikal. Atlas, Nr. 44). Lamberts flächentreue Azimutalprojektion. Mittelpunktsmassstab ca 1:93,000,000. 6 colors. Taf. 46, "Unsere Kenntnis der Erde" by L. Carrière, *Pet. Mitt*, Vol. 57, II, Dec., 1911, pp. 347-351.

[A graphic representation of our knowledge of the earth's surface based on a careful survey of the detailed map material extant. No maps on a smaller scale than 1:1,000,000 have been included, this scale being considered to express the outer limit of geographic knowledge laying any claim to completeness.

The cartographic delineation of the earth's surface is treated under three heads: land, coast and ocean.

The maps of the land surface are divided into those based on instrumental surveys and those based on route surveys. The following scales are chosen as the limits of the subdivisions of these two groups: for the former, 1:63,360 and 1:253,440; for the latter, 1:600,000 and 1:1,000,000.

Coasts are divided into those known, (1) from complete surveys, (2) from incomplete surveys, sufficient, however, for local navigation, (3) from general exploration for nautical purposes and (4) those lacking all investigation of a nautical nature.

Our knowledge of the ocean floor is represented by the number of soundings made. Each "square degree" within which five or more soundings have been made is colored areally: soundings in "square degrees" which contain less than five are indicated by the proper number of dots.

The results show what immense areas of the earth's surface are not well-known, according to the author's definition of that term: on land, all of North America north of the limit of fairly dense settlement in Canada (although this ignores the various detailed maps of Alaska published by the U. S. Geological Survey [Seward Peninsula, Nos. 646A-D, 1:62,500, Nos. 655-657, 1:250,000; Yukon Basin, Nos. 640-642, 1:250,000, etc]), South America, north of 22° S. and east of the Andes, the Sahara, Arabia, Central Asia and practically all of Siberia; on sea, the greater part of the ocean bottom except for the coastal strip and the continental shelf and, of the abyssal deeps, the lines followed by the cable systems of the world.

Too great stress cannot be laid upon the importance of compilations of this nature; they afford the broad generalizations without which detailed studies remain but fragmentary. (Cf. also comment on map of Africa showing the progress of exploration, *Bull.*, Vol. 44, No. 1, 1912, p. 78)].

World. Die geographische Gliederung der Erdoberfläche. Von Ewald Banse. [Mollweide's Projection] 1:100,000,000. 12 colors. Taf. 1, "Geographie" (first part) by E. Banse, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 1–4.

[An attempt to divide the earth's surface into geographic units based on the consideration of anthropo-geographic as well as physico-geographic factors. Fourteen units are established. With their subdivisions these are:

(1) Europe [exclusive of Russia]: (a) Northern, (b) Central, (c) Western, (d) Southern, (e) Farther.

(2) Greater Siberia: (a) Russia, (b) Caucasus, (c) West Siberia, (d) East Siberia, (e) Kirghizia, (f) Turan.

(3) Mongolia: (a) Mountainous Mongolia, (b) Tarim, (c) Gobi, (d) Tibet, (e) Pamir.

(4) The Farther East ["Ostasien"]: (a) Manchuria, (b) North China, (c) South China, (d) Japan.

(5) [Greater] India: (a) Himalaya, (b) Punjab, (c) Hindustan, (d) Burma, (e) Indo-China, (f) Sunda Islands, (g) Borneo, (h) Celebes, (i) Philippines.

(6) Greater Australia: (a) West Australia, (b) East Australia, (c) New Zealand, (d) Melanesia, (e) Micronesia, (f) Polynesia.

(7) The Orient: (a) Atlas, (b) Sahara, (c) Greater Arabia, (d) Aryan Orient.

(8) Nigritia: (a) Sudan, (b) Abyssinia, (c) East Africa, (d) Congo, (e) South Africa [Kapland], (f) Madagascar.

(9) America [non-Cordilleran North America]: (a) Canada, (b) Missouria, (c) Appalachia, (d) Labrador.

(10) Greater California: (a) Alaska, (b) Columbia, (c) California, (d) Mexico.

(11) Andina: (a) Panama, (b) Antilles, (c) Ecuador, (d) Atacama, (e) Chile.

(12) Amazonia: (a) Llanos, (b) Guiana, (c) Amazonas, (d) Brazilia, (e) La Plata, (f) Patagonia.

(13) Arctic.

(14) Antarctic.

Whatever criticism might be made of details, the method underlying the establishment of these divisions is geographic in the broadest sense of the word.]

World. Indexkarten zum Kartographischen Monatsbericht [of *Petermanns Mitteilungen*]. IV. Jahrgang 1911, Nr. 4–6, 7–9, 10–12. *Pet. Mitt.*, Taf. 6 and 27, Vol. 57, II, and Taf. 13, Vol. 58, I, July and Oct., 1911, and Jan., 1912, respectively.

[Eleven maps comprising the world on which are shown the limits of the majority of the maps listed in the cartographic bibliography for April-June, July-Sept. and Oct.–Dec., 1911, respectively. Distinction is made between geographic-topographic, geologic, physical-statistical maps and nautical charts].

OCEANOGRAPHICAL

North Atlantic Ocean. [Hypothetische Darstellung der Verteilung der magnetischen Abweichung im Atlantischen Ozean um das Jahr 1500. Von Prof. Dr. F. Nansen]. [Mercator's Projection: equatorial scale 1:62,000,000]. 70° - 15° N.; 80° W. - 20° E Accompanies "Die magnetische Abweichung im Anfang des 16. Jahrhunderts" by F. Nansen, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 8–12.

CARTOGRAPHICAL

World Geeignete Kartenprojektion zur Darstellung der erdmagnetischen Elemente. Von H. Wehner. [1:170,000 000]. Taf. 48, note with same title by same author, *Pet. Mitt.*, Vol. 57, II, Dec. 1911, p. 351.

[Cf. similar map listed under "Cartographical," *Bull.*, Vol. 43, No. 10, 1911, p. 799].

HISTORICAL

Western Europe and Eastern North America. (a) Nordwestlicher Teil der Karte des Juan de la Cosa aus dem Jahre 1500. (b) Teil der Karte des Pedro Reinel [East Coast of Newfoundland]. Accompany "Die magnetische Abweichung im Anfang des 16. Jahrhunderts" by F. Nansen, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 8-12.

EDUCATIONAL

United States. Bathy-Orographical [School Wall] Map of the United States. Constructed and Engraved by W. and A. K. Johnston, Ltd., . . . Edinburgh and London. 1:4,100,000. 52° - 15° N.; 128° - 65° W. 12 colors.

[This map, although showing the same careful compilation as the other maps belonging to this series, best illustrates the lack of plasticity in the representation of relief, resulting from the use of "layer" coloring *without* hachuring, which was criticized in the *Bull.*, Vol. 42, No. 11, 1911, p. 879. The use of a tint for heights between 2,000 ft. and 5,000 ft. which is not sufficiently differentiated from the next higher group of altitudes, emphasizes this feature most unfortunately in this case, as it precludes bringing out the abrupt rise of the Rocky Mountain System from the Great Plains].

The Atlantic, Pacific and Indian Oceans. [Three school wall maps on Mollweide's Projection, 1:20,000,000, entitled:] (a) The Atlantic Ocean [hemisphere bounded by 140° W. and 40° E.]. 11 colors. (b) The Pacific Ocean [hemisphere bounded by 110° and 70° W.]. 11 colors. (c) The Indian Ocean [hemisphere bounded by 0° and 180° E.]. 11 colors. In "New Series of Bathy-Orographical School Wall Maps", W. & A. K. Johnston, Edinburgh. Each: unmounted, 9/-; mounted, 10/-; mounted and dissected, 12/-.

[For reference to this series as exemplified by the map of Europe see under "Educational", *Bull.*, Vol. 42, No. 11, 1911, p. 879. The above three maps, particularly those of the Atlantic and of the Pacific Ocean, are especially valuable for teaching the form of the ocean basin, because the oceans are rarely represented in their totality on wall maps. Ocean depths are indicated by six shades of blue, with 100, 1000, 2000, 3000 and 4000 fathoms as their limits. The nomenclature used for the forms of sub-oceanic relief is that adopted by the commission appointed at the Seventh International Geographical Congress. Traces of Sir John Murray's nomenclature, however, are visible in the use, on the map of the Pacific, of 'Tuscarora Trench' instead of 'Japan Trough', although the latter term, consistent with the others used, appears on the map of the Indian Ocean].

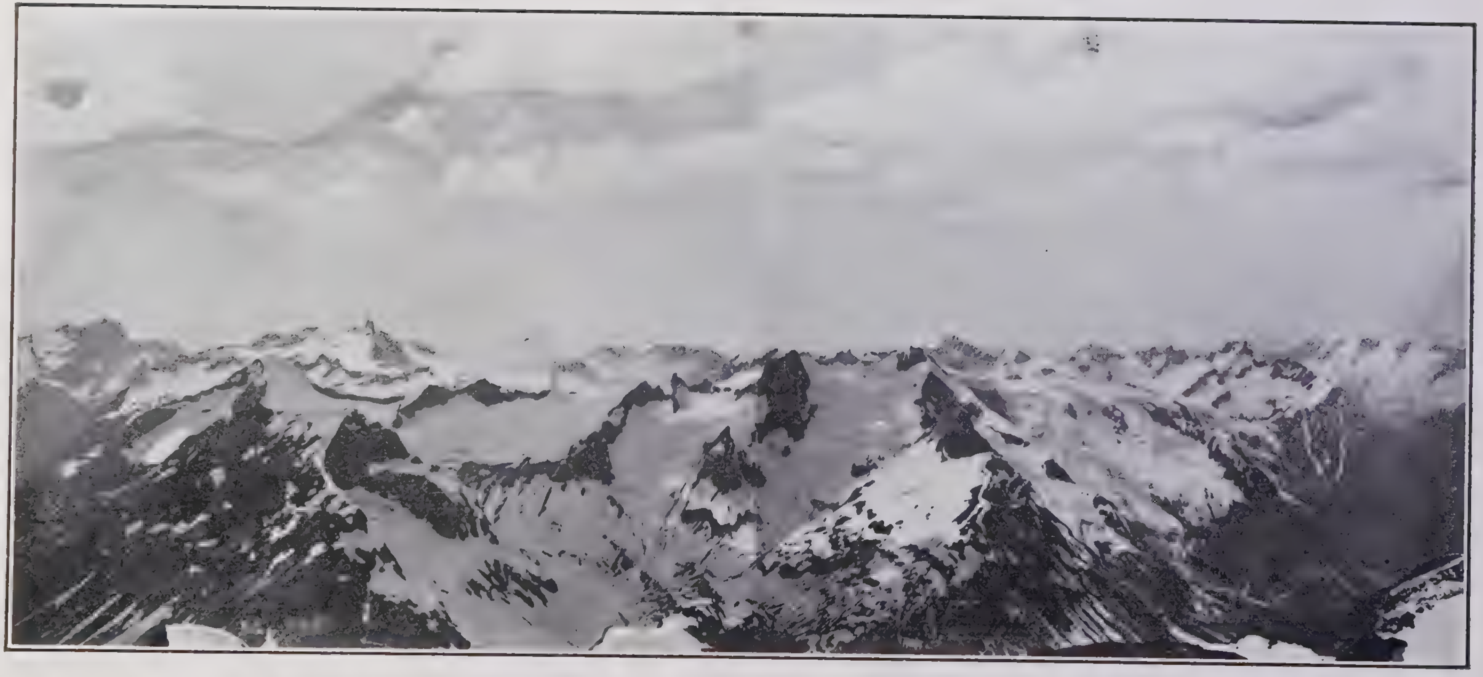

FIG. 1—Nameless Peaks of the Northern Selkirks. Valley of the north fork of Gold Stream on the left, valley of Windy River on the right. The main Selkirk Divide follows the ridge in the right foreground. View looking west from above Silvertip Pass.

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NOTES ON THE EXPLORATION AND THE GEOGRAPHY OF THE NORTHERN SELKIRKS, BRITISH COLUMBIA

BY

HOWARD PALMER
Secretary of the American Alpine Club

(Map facing p. 256.)

That the territory occupied by the northern portion of the Selkirk Mountains has so long remained unexplored from the standpoint of geographical science is a rather striking illustration of the influence which topography exerts upon the trend of human activity. Entirely surrounded by well-defined routes of travel—the Canadian Pacific Railway on the south and the Columbia River sweeping through its "Big Bend" on the northeast and west—the tract has offered slight inducement to exploration for additional channels of communication, while to nearly all save trappers and prospectors its steep mountain walls and forest-choked valleys have proved disheartening barriers.

It is the purpose of the present paper to outline the more important of the earlier explorations that have thrown light upon this area and then to set forth briefly certain data concerning its internal topography noted by the writer in the course of several recent journeys.

I. EARLY EXPLORATIONS

Prior to the construction of the Canadian Pacific Railway what little east-and-west traffic existed across this portion of British Columbia was carried on by the agents of the great fur companies* and followed the obvious route around the northerly end of the range afforded by the valley of the Columbia River. That this involved a detour of about one hundred and fifty miles from a direct line was not a serious objection when the way was comparatively clear and free from untoward hardship. It was not until the commencement of systematic exploratory surveys for a railroad to connect the Crown Colony of British Columbia with the rest of the Dominion that serious efforts were made to find a straighter path across the mountains.

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* "The Dominion at the West" by A. C. Anderson, Victoria, 1872, p. 1.

Probably the earliest attempt of this nature was that undertaken by Walter Moberly, C.E., in 1865. In the course of a march easterly from Shuswap Lake, having discovered Eagle Pass through the Gold Range, he pushed on in the same direction up the Illecillewaet River on the opposite side of the Columbia to the forks of the stream. Here the refusal of his Indians to complete the crossing of the range even if a pass were found at the head of the easterly branch as he thought probable, made it useless for him to continue thither, and the northerly branch was entered instead. This failed to furnish the desired pass, so he returned to his starting point forthwith. Before leaving the Columbia, Moberly had detailed an assistant to proceed up that river to investigate the possibilities for a pass at the headwaters of Gold Stream, an important easterly (left) tributary, but this attempt was also unsuccessful. Both expeditions reported that "the valleys in places are very narrow and the mountains on both sides steep and subject to heavy snowslides."*

Before passing to the later operations of the railroad surveys, we may pause for a moment to refer to the discovery of gold along the easterly tributaries of this portion of the Columbia in 1864-5, which gave the section a wide prominence and resulted in a certain opening-up of what had previously been an unknown wilderness. A rush of prospectors at once set in, particularly from the Cariboo district across the Gold Range, and a scene of considerable excitement ensued. Log towns were built, mines were opened, and in the course of several years as much as $300,000 worth of gold was produced, but owing to the remoteness and resulting difficulty in bringing in sufficient supplies the diggings were finally abandoned. The principal placers were located along the bottom lands of Gold Stream, Downie Creek, Carnes Creek and their branches.† One might naturally suppose that the vicinity would have been scoured far and

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*"Report to Surveyor General of British Columbia" by Walter Moberly, C.E., *British Columbia Gazette*, December 23, 1865. This is accessible in the Provincial Secretary's office, Victoria, B. C.

†For an account of a trip into this region twenty years later (1885) see "The Canadian Rockies: New and Old Trails" by A. P. Coleman, New York and London, 1911, pp. 60–78.

wide by these adventurers, but such does not seem to have been the case owing to the extremely difficult nature of the country.*

In 1866 Moberly extended his explorations to include the easterly borders of the Selkirks by a traverse of the Kootenay valley and of the Columbia valley from the headwaters of that river to the Big Bend. He was thus in the best possible position to grapple with the baffling enigma of a suitable location for the railway across the range, when in 1871 he was appointed district engineer of this section. During the winter of this year he accomplished the first known crossing of the chain. Proceeding on snow-shoes down the Columbia River from a point near the mouth of the Blaeberry on the easterly side of the Selkirks, the party turned up Gold River† and followed it to the headwaters. There they discovered a high pass during the passage of which they were "nearly buried beneath an immense avalanche that came roaring down the steep mountainside when we [they] were near the summit." Continuing westward "after a very fatiguing journey" they reached the nearly deserted mining town on French Creek presumably via the valley of Gold Stream.‡ The expedition thus meagerly described seems to mark the end of Mr. Moberly's work in the range. He was undoubtedly the first to acquire a comprehensive knowledge of its topography, which few, if any, subsequent travelers, even present residents of the province, have equaled. The difficulties and dangers involved in such pioneer work among these savage mountains can scarcely be appreciated short of personal experience, and it is well within the truth to state that lesser accomplishments in the world of exploration have received wider recognition.

Owing to various circumstances which do not concern our present purpose the attack on the Selkirk problem was allowed to lapse during the next few years. Its final solution was not officially achieved until 1881, when Major A. B. Rogers, retraversing Moberly's line of march of 1865 up the Illecillewaet River to the forks and continuing thence along the easterly branch, reached the long-sought pass, now well known as Rogers Pass, exactly as predicted by Moberly at that time.§ An instructive illustration of the nature of the obstacle presented by the Selkirk chain is found in the fact that the adoption of this route, the last link in the line, occurred only three years before the passage of the first transcontinental train in November, 1885, when the location had been perfected across the loftier main Rocky Mountain range and the road was in operation as far west as Calgary.

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* "Mineral Wealth of British Columbia" by George M. Dawson, *Annual Report of the Geological Survey of Canada*, Vol. III, 1887–88, p. 40 R.

† Gold *River*, a left affluent of the northwest-flowing portion of the Columbia, into which it empties in 51° 43′ N., should not be confused with Gold *Stream*, just referred to, a left affluent of its south-southeast-flowing portion which it joins in 51° 40′ N. With regard to the terminology cf. *Geogr. Journ.*, Vol. 37, 1911, pp. 178–179. Asst. Editor.

‡ These extracts are quoted from a pamphlet by Mr. Moberly entitled "Early History of C. P. R. Road," pp. 8 ff., to which the writer is indebted for many other facts as well. See also his "The Rocks and Rivers of British Columbia," with map and illustrations, 1885.

§ It is stated in the pamphlet referred to that Albert Perry, an assistant of Moberly, reached this pass in 1866 by way of the Illecillewaet valley.

The selection of this route naturally removed the incentive for systematic exploration to the north, and the further efforts made were confined to the development of its immediate vicinity. Accordingly it has resulted that the interior of the tract under consideration has remained essentially in its primeval obscurity undisturbed by the passage of nearly a century's travel around it via railroad and river. It is unmapped in detail, and, save for the principal streams, its features are for the most part nameless.

II. RECENT EXPLORATIONS*

Passing now to the latest work among the northern Selkirks, allusion may be made to the expeditions of P. A. Carson, Dominion Land Surveyor, in connection with the governmental triangulation of the "Railway Belt." In 1906 and 1907 he pushed northwesterly from the railroad and extended the mapped territory to include the North Fork of the Illecillewaet River and most of Gold River. The work was in the nature of a reconnaissance to select suitable stations for the triangulation, and, accordingly, the reports† as far as they refer to the topography of this section are mainly of a general character, though they afford valuable information within their scope.‡

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*Under this heading it is appropriate to include the subjoined note by the Assistant Editor, though when the following portion of the paper was written it was not intended to do more than to present, besides the writer's narrative, the salient results of the government surveys with respect to the interior geography of the Big Bend region. All reference to other and presumably less important exploratory work in the Columbia Valley, along the railroad, or in territory immediately contiguous to them, is forbidden by limitations of space. Consideration of this work is deferred to a subsequent paper. With respect to the ascent of Surprise Mount referred to below, it will be of interest to alpinists to note that the trip is probably the first recorded ascent in the northern Selkirks.

NOTE.—Mention should here be made of Professor A. P. Coleman's explorations in this region. In 1888, in the first of his attempts to reach Mts. Brown and Hooker, which finally resulted in establishing the falsity of the extreme altitudes with which they had been credited, he made a journey by canoe and raft from Beavermouth down the Columbia, past Surprise Rapids (below the mouth of Gold River) to Kinbasket Lake, whence he was forced to return because of insufficient provisions. On this journey he ascended a mountain on the left bank of the Columbia overlooking the rapids, which he named Surprise Mount. It is probably not far from the " Mt. Stockmer " of Mr. Palmer (*Geogr. Journ.*, Vol. 37, 1911, p. 172). References to Professor Coleman's journey will be found in Part III of the book referred to in the note on p. 242 and in his paper, " Notes on the Geography and Geology of the Big Bend of the Columbia," *Proc. and Trans. of the Royal Soc. of Canada for . . . 1889*, Vol. 7, 1890, Section IV, pp. 97-108. ASST. EDITOR.

† See *Annual Reports of the Topographical Surveys Branch* covering the years 1906, 1907, 1908, and 1909, Appendices 17, 18, 18 and 13 respectively, by P. A. Carson, D. L. S., with maps.

‡ In 1902, during the course of a survey of the mountains along the railroad for the Dominion government, Arthur O. Wheeler, D. L. S., determined the altitudes of two important mountains well within the region under discussion: Mt. Sir Sandford, 11,634 feet, and Mt. Iconoclast, 10,618 feet. Vide his Selkirk Range," Vol. I, pp. 74-75.

The first ascents of Mt. Sorcerer and of a peak situated between the south and the main branch of Gold River called Mt. Sonata (*ca.* 9,800 ft.) are worthy of mention, for both expeditions must have been arduous for men cumbered with surveying instruments and accessories.

During the summer of 1911 the writer, in company with Professors E. W. D. Holway and Frederic K. Butters of the University of Minnesota, made two journeys into the heart of the Selkirks north of the railroad. Our objects were largely those of the mountaineer, but at the same time we planned to adopt such routes and ascend such peaks as would throw all possible light upon the topography both within and beyond the limits previously covered. In particular we desired to trace the water-parting of the range which forms the boundary between the districts of East and West Kootenay,* to locate the passes and generally to untangle as far as we could the exceedingly complicated drainage system. In addition we counted on carrying out a rough survey with transit and camera along with certain glacial, botanical and other scientific observations. The following paragraphs present a brief description of some of the salient orographical features observed.

Our first expedition, starting from Beavermouth in June, descended the Columbia by canoe and turned up Gold River, its first large westerly tributary, as Moberly had done in 1871. We pushed to the limit of navigation by boat and then continued with pack harness. Leaving the main valley for that of the west branch of the river, a base camp was finally established at its source near Sir Sandford Glacier on June 14, where the party made its headquarters for the following five weeks. Supplies were relayed in by two porters.†

For three weeks nearly continuous rain kept us under canvas, but then the storm cleared and with favorable weather we made a week's trip to a valley lying to the southwest beyond the basin of Sir Sandford Glacier about five miles away. From here we ascended an isolated peak (9,400 feet),‡ some three miles further off, commanding the westerly side of the range. This formed an important station, for being situated in the point of the V between the northerly and easterly branches of Gold Stream, it covered these and a considerable reach of the river below the forks as well. Goldstream Mount is suggested as an appropriate name.

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* *Report of Minister of Mines for British Columbia*, 1899, p. 570.

† Detailed reference to this vicinity is omitted since information is already available. See the writer's "A Pioneer Reconnaissance in the Northern Selkirks," *Appalachia*, Vol. 12, No. 1, July, 1909, pp. 16-30, and "Explorations about Mount Sir Sandford, British Columbia," *Geogr. Journ.*, Vol. XXXVII, 1911, pp. 170-179.

‡ The heights mentioned in this paper are estimates based on aneroid readings unless the context indicates otherwise.

To the west, numerous sharp, well-timbered ridges, seldom reaching far above snow-line, succeeded each other in a diminishing series towards the broad valley occupied by the Columbia. Further off along its western bank the Gold Range with its long array of snowy summits was plainly in view stretching far to the north and south.

Northwesterly, the continuation of the Selkirks presented a characteristic complex of sharp, glacier-bearing summits (Fig. 1), varying chiefly in a lessened altitude from the more familiar portions of the chain. At two points, however, elevations of not less than 10,000 feet stood out, one a knot of four peaks since plotted as situated between the headwaters of Big Mouth and French Creeks, for which the name Mt. Dentiform is suggested, the other apparently forming a long even-crested wall along the westerly bank of Windy River. Immediately at our feet on this side flowed the north fork of Gold Stream, taking its source in part from the westerly glaciers of the

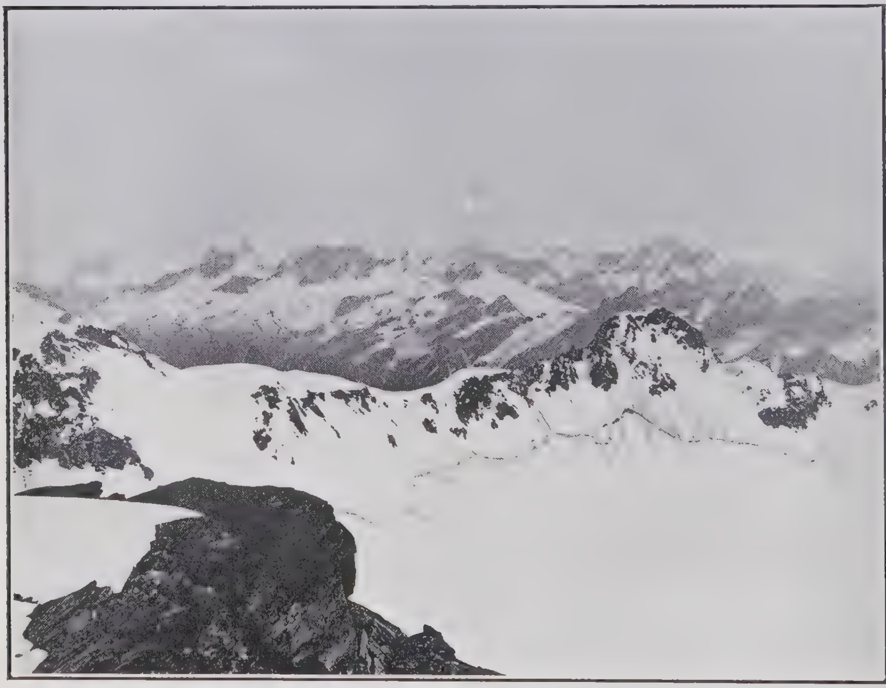

Fig. 2—View south from Gold Stream Mt. showing Mt. Sorcerer on the left and Mt. Holway on the right about 15 miles away across the valley of Gold Stream.

Austerity group. Below these, a narrow pass cut through to what we saw later was a north-trending valley, a branch of Windy River just mentioned. Thus the divide was determined at this point. It is worthy of note that here it approaches within seven miles of the Columbia giving a disproportionately long westerly slope to the range. Towering over all, the relentless peaks of the Austerity group presented an impressive ensemble of chocolate-hued cliffs and pinnacles.

Northeasterly in the direction whence we had come the snowy scene was entirely monopolized by Sir Sandford and his attendant satellites. Easterly in the distance we looked through a pass at the head of one branch of the east fork of Gold Stream, and we at once selected this as the objective of our next excursion, since it occupied the most probable position for the pass by which Moberly had made the first crossing of the mountains as above described. Turning to the southeast and south (Fig. 2), the range continued in a hopeless maze of snowfields and glacier-scarred peaks, among which we recognized Mts. Iconoclast and Sorcerer. A few miles to the west of the latter, a throng of striking summits claimed our admiration, out-topping everything in their immediate vicinity. It was apparent that from any of these the view towards us would be most instructive topographically. Westerly again came the forested ridges extending towards the Columbia, drained in this quarter by Downie Creek. The remarkably long ridge dividing the basins of Downie Creek and Gold Stream culminated in a handsome, sharp, rocky spire which soared above these valleys from the midst of a complicated group of lesser mountains. It is designated on the accompanying map as Mt. Arrowhead, and appeared to be not far from 10,000 feet high. The valley of Gold Stream in this direction is heavily timbered, and the river wanders in intricate meanders among swamps and beaver meadows.

From our camp the following day, we made our way across a snowy pass and a smooth névé, descending over its easterly effluent to the supposed Moberly Pass. From the edge of the névé we saw that it was a long, sparsely timbered saddle to which open meadows and rushing streams, fed by many melting snow-banks among the evergreens, gave a pleasant park-like appearance. As we descended the glacier, the questions arose: Which way does the drainage from the southerly tongue of Sir Sandford Glacier run? Is Citadel Mountain on the divide or not? Our interest and expectancy were keen as we followed the stream downwards along its cascade. Not till we reached the pass itself was the matter clear (Fig. 3). There we saw that the stream curved abruptly to the east forming the source of Gold River and placing Citadel, Sir Sandford and Sir Sandford Glacier on that side of the divide. We were slightly below the actual water-parting and soon hastened up a rivulet to locate the very place. This we found about a quarter of a mile beyond (alt. 5,900 feet) where another glacial brook ran down onto the pass from the same side and then swung sharply west. In this direction the valley dropped away abruptly and the stream cascaded. From the high névé that we had crossed earlier in the day a glacier descended tumbling apparently out of the sky and breaking over a cliff in a magnificent ice-fall for more than 1,600 feet. At the bottom, the stream was reconstructed in two tongues on either side of a rocky cleaver. The whole formed one of the finest and most instructive examples of glacial activity to be found in the range.

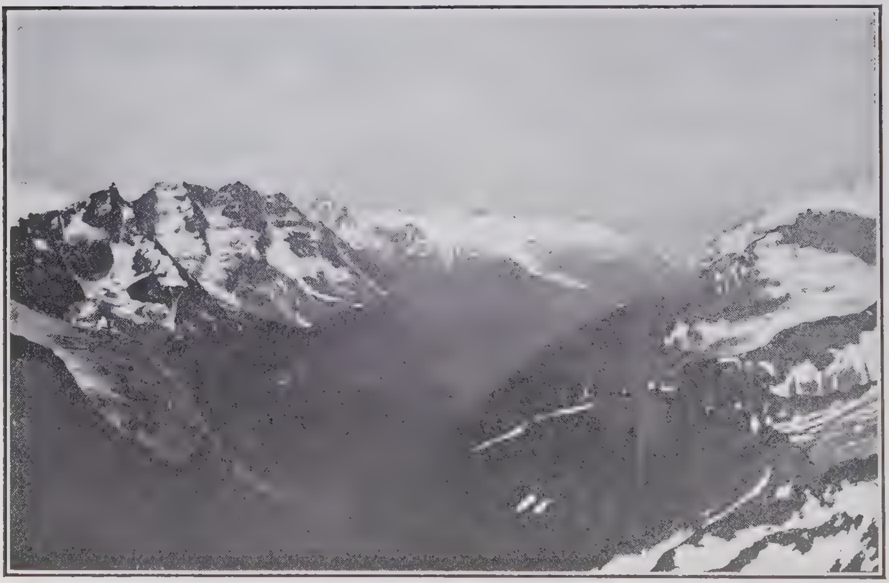

FIG. 3—View west up the main branch of Gold River. Mt. Citadel at the right 8 miles distant; Moberly Pass at the head of the valley.

After carefully studying our surroundings, we felt no doubt but that this was Moberly Pass. It was the most direct route connecting any of the branches of Gold River and of Gold Stream below timberline, and, as Moberly had reported, it appeared obvious that a tunnel would have been necessary for a railroad following this route across the range owing to the steepness of the westerly approach. The pass was similar to Rogers Pass in size and extent, though without as many lofty peaks in view about it. Mt. Sir Sandford was concealed by the ice-fall in that direction. A buttress of Mount Citadel (9,580 feet) and a nameless peak of about the same height to the southeast were the most prominent mountains in the prospect. On the south side extensive névés occupy a higher plateau from which several tongues protrude and all but reach the pass. Only the largest of these, however, is visible from below. It is a rather significant fact that all the branches of Gold Stream and of Gold River correspond almost exactly at the various passes without any interlacing of their courses.

Shadows falling on the pass warned us to curtail further investigations, attractive though they would have been, for a whole range intervened between us and our evening meal. Accordingly, about four o'clock we struck upwards through the woods to regain our morning's route. We climbed into the sunshine an hour or two later, which, suffusing the entourage of glacier and peak with a golden radiance, brought out a picture of surpassing loveliness.

Returning to Sandford camp, the only further trip from this point that need be referred to in detail (though each of the other six climbs to above 9,000 feet yielded either new or confirmatory information of value) is the first ascent of Mt. Austerity accomplished by the party on July 20. This mountain is situated five miles to the north-northwest of the camp and was triangulated at 10,987 feet, giving it a rank of some importance among the loftiest summits of the range.* It commands an unsurpassed outlook to the north and west across the Columbia valley. Wide snow fields, divided into three or more gathering basins by off-shoots of the range towards the river, send down dissipators in this direction. The cluster of summits to which Mt. Austerity belongs is composed entirely of primitive granite, while Mount Sir Sandford, a half dozen miles to the southeast and of greater elevation, is a solid mass of crystalline limestone. This curious juxtaposition of structural extremes presents a problem of considerable geological interest.

These excursions resulted in the determination of the main divide of the range for about eight miles. Numerous photographs had been secured from various points fixed by instrumental triangulation which would furnish a basis for a topographical map of the vicinity. Regaining the railroad at Donald by way of the government trail along the easterly bank of the Columbia, we at once set about preparations for another visit to this splendid alpine region.

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*The average height of twenty-two peaks which have been triangulated at altitudes of 10,500 feet and over is 10,800 feet. The height mentioned for Mt. Austerity depends upon the value 11,634 accorded Mt. Sir Sandford by Wheeler's survey.

Our second expedition, setting out from Albert Canyon August 10, struck inland by way of the valley of the North Fork of the Illecillewaet River in order if possible to reach the peaks noted from Goldstream Mount from this side. Though Carson's reports previously referred to describe a road to the head of this valley, locally no reliable information could be obtained as to its condition or the character of the mountains thus accessible. Accordingly, as the bridges and trail might turn out to be impassable for horses, we employed our former porters and succeeded in reaching the pass at the head of the North Fork (Illecillewaet Pass) on the evening of the second day without encountering any obstacles more serious than those offered by our packs. Camp was established here for the ensuing week (August 12-19).

The North Fork valley presents some points of contrast to the ordinary valleys of the range, and for this reason a somewhat detailed reference to it may be warranted. Most commonly Selkirk valleys exhibit the sharpest possible contrasts between heights and depths. Their walls, frequently sheer cliffs, plunge down directly to the streams below. Profiles are sharp and bold with rounded forms in the minority. The valley in question, however, though gorge-like near its mouth, opens out after some miles rather widely. The mountains retreat on the east and stretch out to the north and south in a long ridge of alpine meadow-land seldom cut by passes below timber-line. This serves as a base from which the separate massifs rise, with wide gaps between, to perhaps 9,000 feet. There are only four or five of these mountains between Corbin Peak that overlooks the railroad at the southerly end and Mt. Sorcerer. They are all rather subdued in contour and bear comparatively little perpetual snow and ice on their westerly sides.

Of quite a different aspect is the range to the west. Though, from the valley, nearer spurs screen the higher summits for the most part, occasional fleeting vistas up tributary creeks disclose fine bold crags and lofty walls set among snow-fields and glaciers, some of which are about 10,000 feet high. About a dozen miles above the mouth these form quite an impressive display. At this point the valley bottom expands into meadows rankly overgrown with tall grass and weeds where the river relaxes somewhat from its usual headlong course.

These characteristics suggest to the wayfarer that possibly this valley formed a kind of eddy in some remote disturbance which increased the elevation of the range to the west without affecting its easterly wall to the same degree. Near the mouth of the valley at

Albert Canyon, Archean rock is disclosed.* For the upper five miles below Illecillewaet Pass, the valley wall on the west consists largely of dark gray limestone which crosses to the east in the vicinity of the pass and continues along this side to the north. From Mt. Sorcerer southerly the easterly wall appears to consist of a reddish brown quartzite. The river, in consequence of getting most of its supply from the west, has a dirty, black appearance in time of flood. From our camp on the pass many violent contortions in the strata and numerous faults were noted.

Illecillewaet Pass has an altitude of about 5,900 feet with scarcely a vestige of timber. The slopes thereabouts are grass covered and unusually bare of alders. To the west, a thousand feet above the pass, there is a small snow-field which sends down two tongues from the ends of which streams flow in opposite directions to Illecillewaet River and Downie Creek respectively. The latter valley continues the direction of the former to the north, and from Corbin Peak it should be possible to obtain an unobstructed view directly up this trough for thirty miles.

From our camp at Illecillewaet Pass we made the first ascent of Mt. Holway (Fig. 4) situated about five miles to the west of the pass, and affording by its elevation of something over 10,100 feet an unequaled outlook. We found with some satisfaction that this mountain belonged to the group of prominent peaks which we had noticed from Goldstream Mount, and in fact occupied an advantageous position in their midst. To the west we looked down into what is probably the chief source of Downie Creek. It is an exceedingly deep basin surrounded by precipitous walls, above which to the south lies a wide snow-field, culminating in a low dome some eight miles from our belvedere. The dome is cut off from the range forming the western wall of the basin by a narrow timber-line pass which is presumed to connect with Carnes Creek. Continuing northerly, the range attains an altitude almost equal to that of Mt. Holway in a lofty scallop-crested wall from which one large and numerous small glaciers stream valleywards in beautiful ice cascades. Glistening in the afternoon sunlight with fleecy clouds drifting lazily overhead, the range presented a serene alpine picture, and Serenity it has since been named. Mt. Serenity is suggested for the most prominent summit dominating the trunk glacier. Northwesterly were the depressions of the lower courses of Downie Creek and Gold Stream where the mountains did not in many cases surpass the snow-line. Topographically the most striking feature in this vicinity is the Arrowhead group, mentioned above, which separates these streams. It was seen to be connected with the water-parting of the range by a winding, serrated wall some fourteen miles long, pierced in several places by high passes. At the point where the branch of Downie Creek descending from the pass makes its sharp turn to the west, this wall parts their streams by less than four miles. In this direction, between the branches of Downie Creek, the Illecillewaet Range continued from our standpoint, rising in two instances to elevations of some prominence.

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* "A Note on the Geological Structure of the Selkirk Range" by Geo. M. Dawson, *Bull. Geol. Soc. of Amer.*, Vol. 2, p. 173.

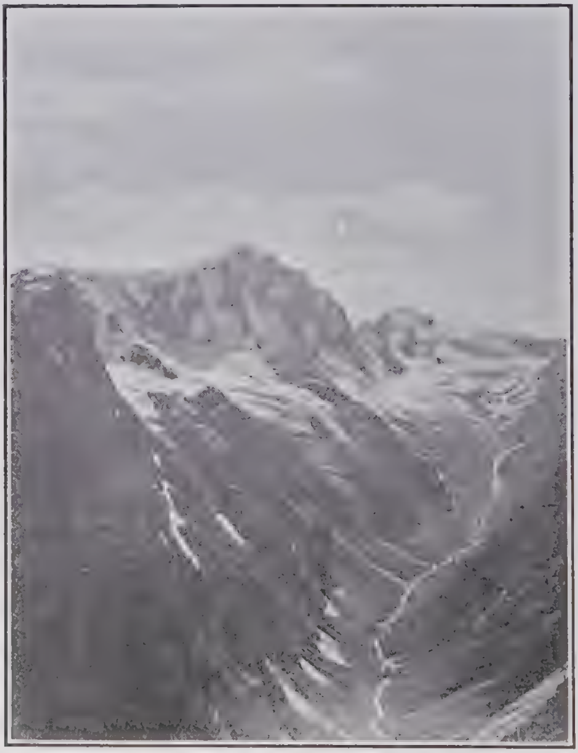

FIG. 4—Mt. Holway seen from the northeast across Downie Creek. The valley in the right foreground is that of a small left tributary of Downie Creek.

The familiar peaks near Mt. Sir Sandford described above were all in view. Swinging easterly and then southerly the panorama embraced the entire known range, all the mountains about Glacier as far south as Mt. Sugarloaf and the Battle Range being readily made out. In its remarkable scope of fully seventy-five miles along the backbone of the Selkirks, the outlook from Mt. Holway can scarcely be equaled save perhaps by that from Mt. Sorcerer nearby. Southerly in the direction whence we had come, the Illecillewaet Range presented an interesting line of jagged summits (Fig. 5). For the highest, a forbidding snowless horn, about six miles distant, the name Mt. Moloch is suggested.

A second excursion from our headquarters to the top of Mt. Sorcerer (10,500 feet) (Fig. 6) east of the pass afforded valuable data on the immediate vicinity, but owing to clouds settling down about the summit just before we arrived it was impossible to make any distant observations. A long even ridge descending towards Mt. Iconoclast separates the basins of Gold River and Mountain Creek, both of which streams have their sources in the glaciers of the mountain. To the north, across the valley of Gold River, we had a good view of the pass leading into the southwesterly branch of Gold Stream. It is a snow-line pass, but without glaciers on either side,

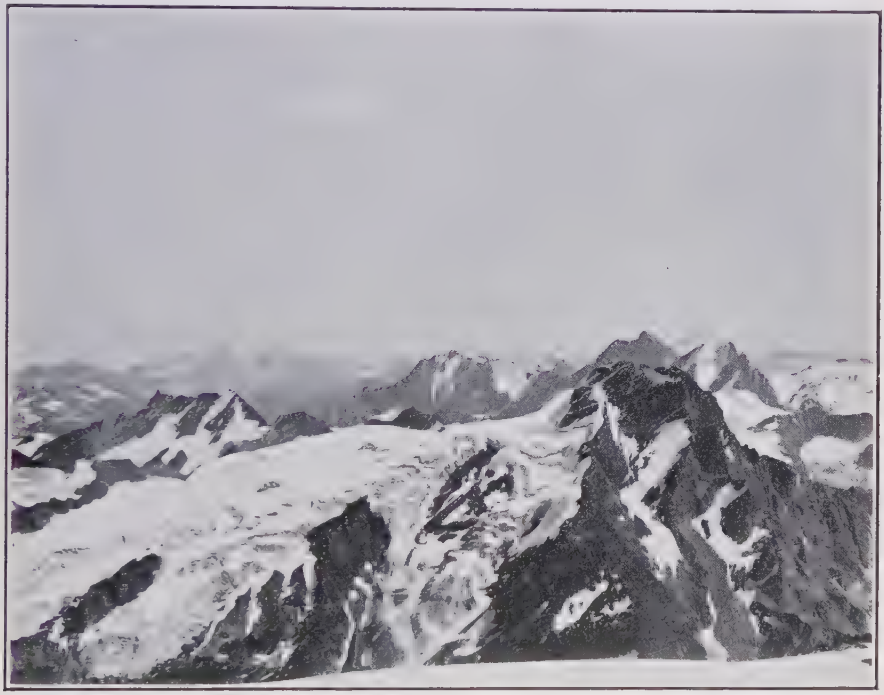

Fig. 5—View southeast from the summit of Mt. Holway along the Illecillewaet Range. Mt. Moloch in the distance at the right, the valley of the North Fork of the Illecillewaet River at the left.

and is probably passable for horses, though the lower approaches were not clearly seen.

After remaining nearly four hours on the summit, we were finally forced to descend amid thick snow flurries and snapping electrical discharges from the rocks. The mountain is the key to the drainage system of the Big Bend region, for within a radius of less than three miles is included the sources of its four longest rivers, Downie Creek, North Fork of the Illecillewaet, Mountain Creek and Gold River, and a short extension would take in that of the fifth, Gold Stream. Both Mt. Sorcerer and Mt. Holway furnish most valuable stations for the surveyor, the latter, perhaps, being the easier to occupy with an instrument.

A few days later a visit was made to the grassy saddle connecting the south branch of Gold River with Downie Creek. The aneroid gave its elevation as 6,800 feet, and except for the steep descent into the latter valley it should be practicable for horses. The bottom lands along Gold River appeared unusually open and grassy for a long distance.*

Having accomplished our principal objects by these excursions and the weather being unsettled, we returned to the railway in two days. On the way we halted at the mouth of a tributary valley leading to Mt. Moloch with the intention of exploring a splendid glacial amphitheater of which we caught glimpses through the trees in that direction, but sixteen hours of rain with a falling barometer forced us to abandon the project.

The accompanying map embodies the large topographical results of our trips. Its especial aim is to exhibit the relations between the trunk streams of the northern Selkirks with their chief connecting passes. It has not previously been possible for any one entering and following one of these valleys to know in what portion of the range he would eventually come out, but it is believed that this difficulty will no longer exist owing to the fact that our party was fortunately able to occupy summits along the axis of the range which covered the sources and upper courses of the master streams. Indeed, except for the territory northeasterly from Revelstoke and the very tip of the Big Bend itself, there is little of the region that has not been visible from our stations. The map consists of a reduction from the writer's work founded on an independently measured base fitted into the border of previously mapped country after alteration to a common scale, both being adjusted to a mean agreement on the various overlapping points. The only changes worthy of mention that this process rendered necessary in the previous map occurred in the upper and middle courses of Gold Stream and Downie Creek. As these were apparently largely generalizations, the less hesitancy was felt in altering them to agree with the later observations.

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* NOTE ON THE PASSES. It may be of value to list briefly the principal passes connecting these trunk valleys not already referred to.

Between Mountain Creek and what is probably the south branch of Six Mile Creek a high pass was seen south of Mt. Iconoclast. The approach is steep, though snowless on the side of the former.

Between Mountain Creek and the south branch of Gold River there are two passes, the more northerly being a broad open pass. Both are above snow-line and probably have glaciers on the north.

Between Downie Creek and Gold Stream there is a high pass at the westerly turn of the former. The Gold Stream side supports a small glacier.

Sir Sandford Pass (8,100 feet), west of Mt. Citadel at the head of Sir Sandford Glacier, leads down to Moberly Pass. It is practicable only for mountaineers, as seven miles of glacier must be traversed.

Silvertip Pass (8,400 feet) between the glacier of the same name and the valley of the north fork of Gold Stream is also a glacier pass suitable only for mountaineers, but it is the most direct line across the range in this region.

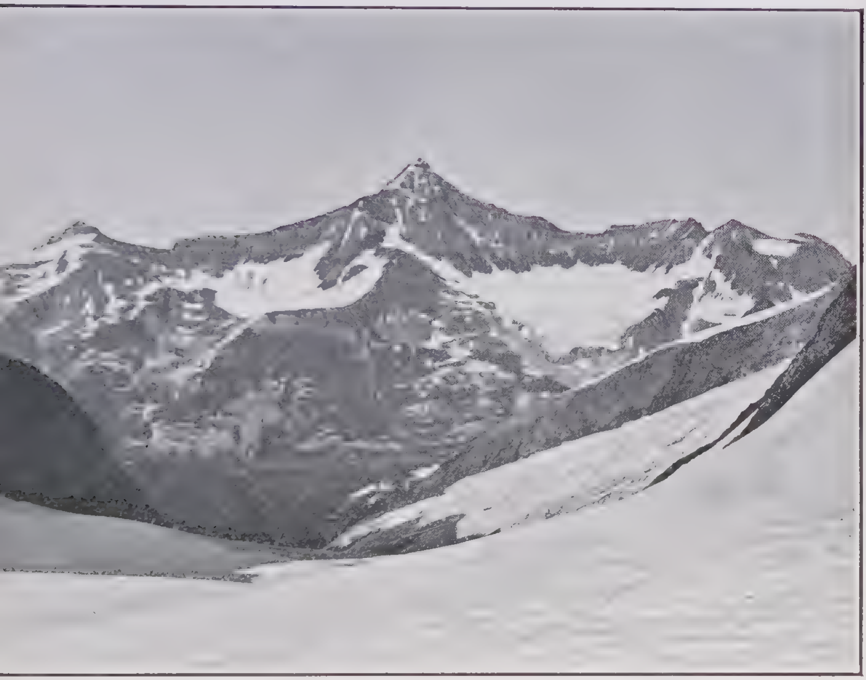

Fig. 6.—Mt. Sorcerer seen from the southwest across the valley of Downie Creek.

III. Conclusion

In conclusion, a brief summary of the physiographical characteristics of the Big Bend region may be appropriate. In area it covers about 2,400 square miles, which is entirely occupied by an exceedingly complicated labyrinth of mountainous spurs and ridges that may be considered for present purposes as forming the northerly termination of the Selkirk Range. The greater number of these rise to between 7,500 to 9,000 feet in altitude, but there are many summits ranging between the latter limit and 11,634 feet, the highest measured point. That these figures indicate more than an insignificant relief is evident from the fact that the Columbia, in circling around the range, descends from about 2,400 feet at Beavermouth on the east to nearly 1,400 feet at Revelstoke on the west, so that almost always the visual angle cuts a vertical sweep of 5,000 feet, while one of 6,000 feet is not uncommon and even of 9,000 feet is not unknown.

With a snow-line that may be placed in the neighborhood of 7,500-8,000 feet, and a heavy precipitation, conditions are most favorable for glaciers, and these exist in the greatest profusion in all parts of the range. Examples of every recognized class are to be found with the exception of the continental, and even this is represented in miniature by single bodies of ice aggregating ten square miles in extent.

Below snow-line, the valley slopes are densely forested with spruce, fie, hemlock, yew, cedar, and pine, while in the bottom lands cottonwoods, birches, alders, and poplars are also to be found. These, intermingled with a varied undergrowth of tropical luxuriance and combined with canyons, precipices, falls, and rapids, form a nearly complete category of the obstacles with which prolific nature opposes the explorer. The final items (*caveat viator!*) are the mosquitoes, that flourish up to 6,000 feet, and the precarious weather, with regard to which it has been said with a near approach to truth that every sign means rain.

LETTERING BY J.H.F.

N. B.—The values on the linear scale should read 0, 2½, 5, 10, 15 miles.

PRESENT ACTIVITIES OF THE COAST AND GEODETIC SURVEY*

BY

O. H. TITTMANN
Superintendent of the United States Coast and Geodetic Survey

There are various reasons why the head of the Coast and Geodetic Survey should be particularly glad to speak to an association of his colleagues in the engineering profession in Philadelphia. Philadelphia stands in a certain maternal relationship to the Coast Survey for, when the question of organizing a survey was up, the government turned to members of the American Philosophical Society for counsel and guidance. In response to the circular of the Secretary of the Treasury, calling for plans for the conduct of a survey, thirteen plans were submitted. These were fortunately referred to the then Vice-president of the American Philosophical Society, as Chairman of the Committee, to decide on the adoption of the best plan. The Committee endorsed the scientific methods proposed by Mr. Hassler who became the first Superintendent of the Survey.

It was a good example to set, but one which the government has not always pursued, to have the fundamental principles on which a work of applied science should be done, submitted to scientific men for consideration. To engineers it may seem as though no other way could have been chosen, than the one that prescribed a trigonometric survey as the basis of an extended survey, but as a matter of fact other methods were proposed. These things occurred in 1807, from which date it is seen that this Bureau is old in years, but facts will show that it is young in spirit, and strives to march in the van of progress, to lead where it can, and to follow only where it must. When the plans for a survey were made the Coast of the United States extended from Maine to Florida. The Floridas, much of the Gulf Coast, the Pacific Coast and Alaska were geographical conceptions outside of what is now the United States. At the present time the work of the Survey has been extended to the Philippines, the Hawaiian Islands, and other islands under the jurisdiction of the United States.

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In brief language the following extract, from an official publication, describes the duties of the Survey:

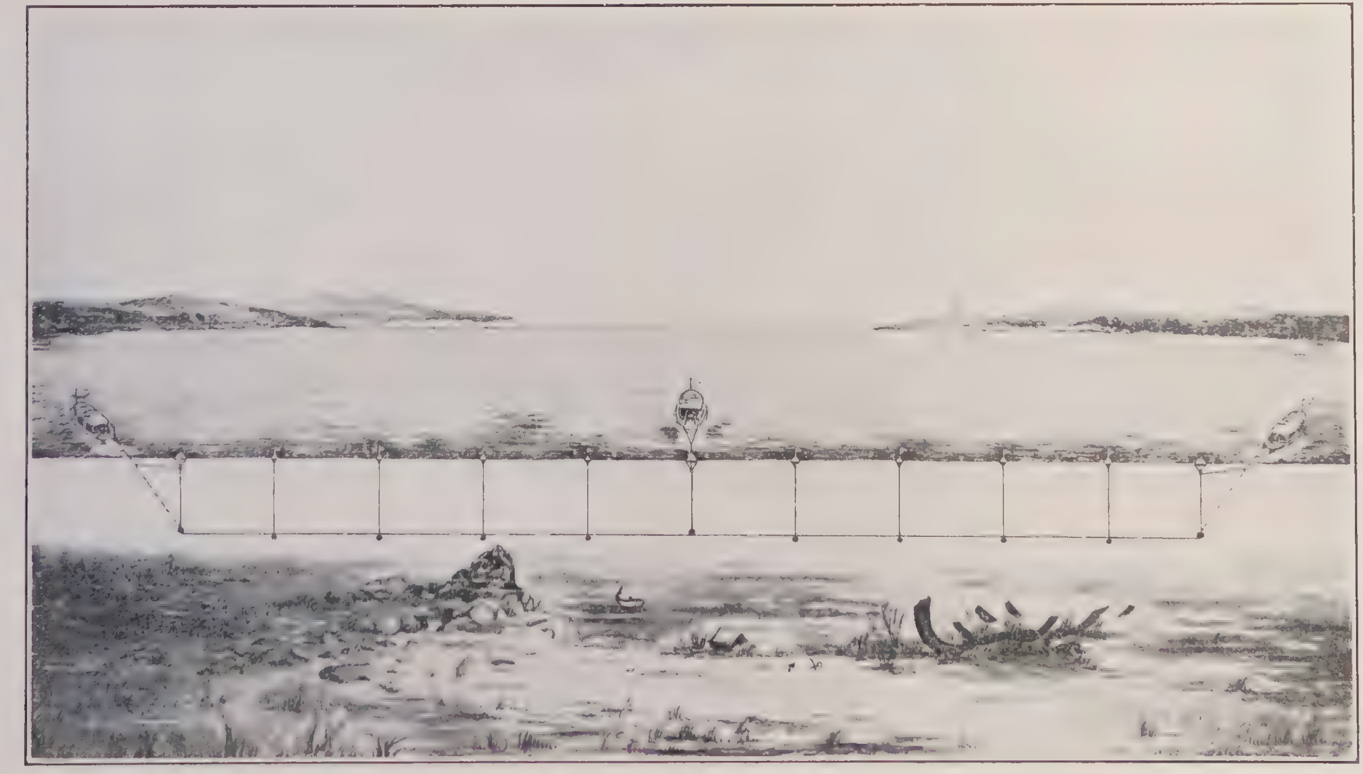
> "The Coast and Geodetic Survey is charged with the survey of the coasts of the United States, and coasts under the jurisdiction thereof, and the publication of charts covering said coasts. This includes base measure, triangulation, topography, and hydrography along said coasts; the survey of rivers to the head of tide-water or ship navigation; deep-sea soundings, temperature, and current observations along said coasts and throughout the Gulf and Japan streams; magnetic observations and researches, and the publication of maps, showing the variations of terrestrial magnetism; gravity research; determination of heights; the determination of geographic positions by astronomic observations for latitude, longitude, and azimuth, and by triangulation, to furnish reference points for State surveys.
>
> "The results obtained are published in annual reports, and in special publications; charts upon various scales, including sailing charts, general charts of the coast, and harbor charts; tide tables issued annually, in advance; Coast Pilots, with sailing directions covering the navigable waters; Notices to Mariners, issued monthly and containing current information necessary for safe navigation; catalogues of charts and publications, and such other special publications as may be required to carry out the organic law governing the Survey."

It is because of the vastness of the subject that this paper is intended to touch upon present progress, conditions, and problems only and much that would be of interest and importance must be omitted.

The principal business of the Survey is making charts of the coasts. If there were no changes in the depth of channels, if the artificial aids to navigation remained fixed and unchanged, if the aspect of the shores from the navigator's viewpoint remained the same, if the draft of vessels remained the same, if the variation of the compass remained the same, if, in short, things were not as they are on this changing globe, or the world were commercially fossilized, a survey once made would last forever. The actual facts are different.

Time was when it was a matter of small concern what dangers to navigation might lurk at a depth of more than 20 feet, but with the increased size and draft of vessels and their enormous cost, a revision and reëxamination of much of the old hydrography by new methods has become necessary. The channel sweep and wire drag now supplement the lead. After these new appliances have swept the bottom the Survey may look with equanimity on the evolutions of ten-million dollar battleships in our waters.

With every new chart that is published the Office assumes the responsibility of keeping it correct, showing the changes in the magnetic variation, in the depths, and in the landmarks. This necessity,



Coast and Geodetic Survey, Wire Drag.

For locating sunken rocks and like dangers to navigation which the usual methods of sounding fail to discover. The long wire, suspended at any desired depth from specially designed buoys, is dragged through the water by two or more launches. The length varies from 100 to 12,000 feet.

affecting the great number of charts that are published, engrosses the energy of the small force at the disposal of the Survey to so great an extent that it has become necessary to simplify the charts in many particulars. Not only do the results of these extended activities flow into the Office, but through the coöperation of the Corps of Engineers of the Army, its surveys for improvements are at once furnished to the Office. A hearty coöperation now exists between most Bureaus of the National Government.

When the publication of charts was first commenced they were engraved on copper in minute detail and with all the skill and beauty which the engraver's art could command. This system was followed until the problem of keeping the charts correct became one of overshadowing importance, on account of the detail shown on them not absolutely necessary for the navigator.

The first survey of the coasts having been completed it appeared possible also to reduce the number of charts by a rearrangement. Careful consideration of the economics of the problem showed that by such a rearrangement of limits, and by simplification, it would be possible to meet the ever increasing demands made on the Survey. These changes involve at the outset much work, but by following a consistent policy they can be brought about gradually without too great a strain on the resources of the Survey.

The tidal and current data hold a prominent place on the charts. In regard to the former, the charts give ample information, and this is supplemented by the publication of tide tables covering the world and which for completeness are unequalled by any publication devoted to this purpose. The Survey has recently completed a tide predicting machine of great scope and power. The theory of tides has been illuminated and advanced by researches made in the Bureau so that in this particular the Survey holds its place in the front rank.

In regard to currents, it must be said that much remains to be done, but this work has been delayed and crowded aside by the more pressing needs of commerce in other directions.

Just as the tide tables supplement the charts so do the sailing directions, designated as Coast Pilots, and to the preparation of which the labors of a number of experts are devoted.

Magnetics. It is a part of the regular duty of the Survey to show on the charts the magnetic declination and its annual variation. Unfortunately, the laws governing this phenomenon are unknown. Of late years Mother Earth has made a sudden acceleration of the rate of variation. Thus, along the coast of Maine, the change has been from 3 to 6 minutes per annum and, on the far western coast, from 2 to 5, while the line of no variation persists fairly well in staying in one place. It is, therefore, part of the Survey's duty to record these eccentricities of the needle. As an important auxiliary to their detection, the Survey maintains a magnetic observatory in Vieques, an island lying to the east from Porto Rico; another in Maryland, a third in Arizona; one in Sitka, and one in the Hawaiian Islands. In all of these, observations are made by continuous photographic registration. All the world is busy with similar observations, and whenever a scientifically equipped expedition, as for example the recent ones to the Antarctic, starts out, there is a general coöperation between the different governments of the world for the purpose of making simultaneous observations. It is to be hoped that sooner or later the mystery will be fathomed so that predictions of what is going to happen can be made.

The Triangulation and the Figure of the Earth. In so extensive an undertaking as a trigonometric survey of the coasts and interior of our country it inevitably happened that surveys were made in detached localities, in Maine, in Florida, on the Gulf, and on the Pacific coast. Each area was referred to some local datum just as detached leveling would be. Gradually, these separate surveys were connected and it became necessary to adopt an origin of coördinates in reference to which all geographic positions should be expressed.

Every extended triangulation, whose determined positions and relative bearings are to be given, is developed on some adopted spheroid of reference. In the beginning Bessel's spheroid was used by the Survey. Later, the geographical positions were computed on Clarke's spheroid. An enormous amount of computation is involved in shifting from one to another and yet it is desirable to utilize all increase in knowledge of the size and figure of the earth.

In order to meet the difficulties presented by these conditions it was decided to separate the refined investigation of the figure and size of the earth from the practical requirements of using a spheroid, which should be sufficiently close for the practical requirements of the surveyor, the engineer, and the geographer. It is believed that the Clarke spheroid, of 1866, which was adopted by the Coast and Geodetic Survey, satisfies these latter requirements for the whole American Continent. The Survey next selected a particular point in the triangulation and a direction, and now, when triangulation is spoken of as being on United States Standard Datum, the meaning is that the triangulation has been referred to Clarke's spheroid on which this particular point has a definite position.

Not only the Coast and Geodetic Survey triangulation, but that of the Lake Survey also, has been referred to this datum and wherever the topographic work of the Geological Survey has been connected with the triangulation of the Coast and Geodetic Survey it is equally referable to this datum. In this way has been achieved a homogeneous system of geographical coördinates for the vast domain of the United States, and it is not unlikely that Canada and Mexico will continue the same system.

It is not necessary to point out the practical value of a trigonometric survey. New uses for it continually arise. Witness the cadastral survey of Greater New York which is based on U. S. triangulation. The Oyster Surveys of the various States utilize the trigonometric points for the delimitation of the oyster-beds. The Coast Artillery is supplied with data which are used for fire control, and, in general, the network of triangulation forms a basis for coordinating all topographic and economic surveys, and thus the work accomplished is forever increasing in value and usefulness.

Among the unforeseen applications was the demonstration of the precise amount of the displacement of the earth's surface, by the San Francisco Earthquake along the fault line, and the extent of the movement at right angles to it.

Until about six years ago the method of deriving the figure and size of the earth from triangulation was to deduce it from measured arcs of parallels and meridians. That is, after the length of a meridional arc or parallel had been measured, the angle which its termini subtended was astronomically determined. But owing to the irregular distribution of masses on and within the earth's crust the actual direction of the Zenith differed from the geometrical Zenith of the spheroid of reference. This well-known error, called the deflection of the plumb line, was assumed to average out in a large number of arc measurements. At any rate no correction for it was applied.

A great many years ago, Archdeacon Pratt, while studying the pendulum observations made in India, reached the conclusion that wherever there were visible mountain masses such as the Himalayas there was a corresponding defect of mass in the earth beneath, but it was reserved for the Coast and Geodetic Survey to extend and apply this theory in the computation of the size of the earth from arc measurements by introducing into Geodesy what is now known as the principle of Isostasy. This principle is that the matter composing the earth's crust to a certain depth has a tendency to adjust itself to a condition of hydrostatic equilibrium or has done so. Stated in another way, upwards from a certain depth below sea-level, each unit area has the same amount of mass above it whether we measure to the summit of mountains or merely to sea-level.

By trial computations, the most probable depth to which this compensation extends, was found to be about 122 kilometers, or seventy-five miles. Note how the work of the geodesist trenches on the domain of the geologist and geophysicist.

The hypothesis of isotatic compensation having been introduced, the effect of the visible topography for a distance of about 2500 miles was computed for each of the primary triangulation stations of the Survey, and the deflection of the zenith, previously referred to, was corrected at each station. Then the spheroid, whose surface most nearly agreed with the surface of the United States, was deduced and this gave the corrections to Clarke's spheroid. It is safe to say that the values for the compression and semi-diameters of the earth, resulting from these computations, are the most accurate known. It may be added that, when the results of this work were presented two years ago to the International Geodetic Association in London, the Americans were congratulated on having made a new epoch in Geodesy.

The Pendulum. While one must rely on trigonometric observations to determine the size of the earth its figure can be determined by gravity observations, that is, by the pendulum alone. It is, therefore, a very important auxiliary in a Geodetic Survey. For the purpose of comparison the observations made with the pendulum must be reduced to sea-level. The manner of reducing them is one of the moot questions in Geodesy. Now, the recognition of the existence of isotatic compensation, which has been proved by purely astronomic methods, compels one to take it into account in the pendulum reductions. The method of reduction just introduced in the Survey not only does that, but, also, for each station, takes into account the effect of the attraction of visible masses for the whole earth. This is a great stride in advance; but the inevitable logic of this process has not been received abroad with open-minded enthusiasm. The correctness of the method has been proved for gravity work in the United States, and it is for others to show that it does not apply to the rest of the world.

The International Geodetic Association. To make a new epoch in science is no mean achievement; but mention has already been made of the compliment paid to the Americans at the last meeting of the association in London. This association exists by virtue of a formal convention between the great powers of the world. It is an official organization whose object is to promote knowledge of the size and figure of the earth. Canada, the United States, Mexico, and Argentina belong to it. So do Japan and, practically, all the powers of Europe. It is one of the oldest of international scientific associations. The delegates to the meetings report progress, and compare methods and results, and endeavor to strengthen such undertakings as the Cape to Cairo Arc of the Meridian and the junction of the Great Trigonometric Survey of India with the Russian Survey. To carry out this last piece of work the association covets the coöperation of China and hopes that that ancient empire will ultimately join the other powers in the undertaking.

Among the tasks undertaken by the association is the determination of the variation of latitude. For this purpose, it maintains six small observatories in the northern hemisphere, two of which are in this country and are under the direction of the Superintendent of the Coast and Geodetic Survey.

Two years ago the astronomer in charge of the Observatory at Gaithersburg, Md., proposed the construction of a Zenith tube for photographically determining the variation of latitude and, at the author's request, the association gave about $2500 for the purpose. The instrument was constructed in this country, has been mounted, and the preliminary results indicate that a step in advance has been taken by securing a higher degree of accuracy, than was before attainable, with a considerable simplification of methods.

The association meets once in three years and the principal countries in Europe have vied with each other in extending invitations for meeting in their capitals. Although the Coast and Geodetic Survey has taken an honorable part in these meetings it has never had the privilege of extending the hospitality of this country to the association. Mention of this fact is made with the same embarrassment that the author feels in representing a great nation at such meetings, and having to maintain silence when the different nations of Europe are competing for the place of meeting.

The Geodetic Level. The levelling instrument, developed in the Coast Survey, with which nearly all engineers are familiar, may be called a binocular level because there is a telescope attachment by means of which the level is read by the observer without shifting his position. The level bubble itself is set into the telescope tube so as to be near the line of sight. Furthermore, the telescope tube is made of the alloy of nickel and steel called "invar" which has a coefficient of expansion of only about one-tenth that of steel.

The introduction of this level has added greatly to the accuracy of the operations, the speed with which the best grade of work can be done has been much increased, and the cost correspondingly reduced.

In a slightly modified form it is in use in the Geological Survey. The Egyptian, Australian, and Canadian governments have also introduced it, and a recent report of the Director of the Great Trigonometric Survey of India shows that a Commission was appointed to report on its merits, and that as a result of the report all their parties will soon be equipped with it.

The Coast Survey is not the only government agency engaged in leveling. The Survey confines itself to running standard lines which it connects with mean sea-level, at various points along the coasts, the datum planes being derived from long series of tidal observations. The coöperation between various agencies of the government is shown by the fact that all the principal lines of level, those by the Geological Survey, by the Deep Waterways Commission, the Mississippi and Missouri River Commissions, and by the Lake Survey, are utilized by the Coast and Geodetic Survey in a general adjustment which will serve for all time as the basis of heights in this country. The value of this work will continue to increase from generation to generation. The elevations of the bench marks in the precise level net east of the Mississippi River will be held as published, while the next adjustment will fix the final elevations of the bench marks in the net of precise leveling to the westward of that river.

One phase of leveling, which is of scientific interest, was connecting the mean tide level at San Diego with mean tide level at Seattle, where a difference of over three feet was found. Had the levels been run along the sea-shore from San Diego to Seattle, no difference would have developed, assuming the work to have been accurately done. But as the lines were run up to and over high plateaus in the interior, and down again, it was found that the orthometric correction had to be applied, and this brought the operations into perfect accord. That is, the apparent difference of level was due to the route followed. This results from the consideration that two water-level surfaces, one above the other, will not be parallel as one travels north or south. In running east and west it makes no difference, but in running north and south this becomes a measurable quantity.

Our Northern Boundaries. The Superintendent of the Coast and Geodetic Survey is Commissioner for the demarcation of the Alaskan boundary, and for that portion of the northern boundary of the United States extending from the Pacific Ocean to the Bay of Fundy, with the exception of the boundary running through the Great Lakes. The beginning of the settlement of the boundary, through Passamaquoddy Bay, goes back to the Treaty of Peace of 1782; the settlement of disputed questions was again provided for, in the Treaty of Ghent, in 1814, but certain portions of the line were not settled until last year. Some portions of the line have never been laid down on any map but, generally speaking, the duty of the present commission is merely to fix up upon the ground, by surveys and monuments, the line where it has not been heretofore fixed with that particularity with which boundaries should be marked. The distance from the Pacific Ocean to Passamaquoddy Bay, along the boundary, is about 3800 miles, 1200 miles of which are water boundary, running through the Great Lakes. When the boundary to the west of the Lake of the Woods was marked it was supposed that no one would ever feel any particular interest in this unsettled region, and that provisional marks or monuments at long intervals would suffice for all time. Needless to say, the settlement of this country brought with it irritating questions as to the precise location of the boundary line. For the settlement of these questions a joint treaty covering the boundary from end to end was exchanged and ratified, in 1906, although prior to that time an international commission had been at work in a less formal way in restoring old monuments and tracing the boundary where international questions had made it necessary. The triangulation has been extended from the Pacific Ocean to the summit of the Rocky Mountains, and this part of the line has been monumented with aluminum bronze monuments.

To the east of the Rocky Mountains this same thing has been done, at the present time, to within 100 miles of the Lake of the Woods, and the whole boundary has been carefully mapped, for a short distance, on each side of the line. Progress has also been made in surveying the thickly wooded region extending from Lake Superior to the Lake of the Woods, and further to the east the monumenting and surveying is in progress along the northern boundary of Maine.

All this work is done by international coöperation, under two commissioners, one representing Great Britain and the other the United States.

Probably more has been said of the demarcation of the Alaskan boundary than of this northern boundary. The Alaskan boundary work has been going on simultaneously ever since the tribunal, in London, in 1903, settled the vexed question of the location of the southeastern boundary of Alaska. The greater portion of this line runs from mountain peak to mountain peak over inaccessible fields of snow and ice. Starting on the 141st meridian, a little to the west of Mount St. Elias, the line follows these Alpine summits to the head of Portland Canal, and down that canal to the vicinity of the historic parallel "Fifty-four, forty, or fight," and thence to the Pacific. Wherever it was possible to place monuments it was done, especially at all river crossings in the passes; all of the mountain peaks were trigonometrically located and the region was mapped photo-topographically. From photographs taken at determined trigonometric points maps were made by geometric construction. It is hardly necessary to say that the reports of the surveyors, who conducted this difficult and hazardous enterprise, are full of thrilling adventure, but only two lives have so far been sacrificed. Many of the men had the unpleasant experience of dropping into glacial chasms, from which they were rescued, but the two men who lost their lives fell into an abyss and their bodies were never recovered. The field work of the southeastern Alaskan boundary has been nearly completed. The other part of the Alaskan boundary extends from the vicinity of Mount St. Elias, northward along the 141st meridian to the Arctic Ocean, a distance of about 600 miles. There never has been any international dispute as to that part of the boundary, which was defined by the treaty of 1826 between Great Britain and Russia. But for reasons not necessary to give here a new treaty was made in 1906 by which the Commissioners were instructed to determine, by means of the telegraph, a point on the 141st meridian and to trace a north and south line through it, extending from the Arctic Ocean to the southernmost point of this boundary. The physical difficulties of this work are very great owing to the difficulties of transportation and the shortness of the season. The difficulties of transportation are illustrated by the experience of two years ago, when the parties had to march 300 miles to get to the working ground. The plan of the work which is being carried out contemplates a north and south transit line along this meridian, cutting a line through the timber, planting aluminum bronze monuments in rock or cement bases at intervisible intervals, carrying on a triangulation which spans the boundary and the topographic mapping of a strip about two miles wide on each side of it. Aside from the immediate purpose of the delimitation, this work will serve as an admirable basis for coördinating the land and economic surveys which will follow in another generation or two.

The southern limit of the work accomplished along the 141st meridian is at Mt. Natazhat. It is only a provisional limit for it will be necessary to go about 90 miles farther south, through the mountainous ice field which lies to the north of Mount St. Elias.

Just what can be accomplished there remains to be seen, for it is plainly useless to plant monuments on moving glaciers.

Toward the north, in the land of the Midnight Sun, the transit line has crossed a range of mountains whose crests are estimated to be about 7,000 feet high, distant about twenty miles from the coast. The last station is about seven miles from the Arctic Ocean. The topography, triangulation, and monumenting have not been finished quite so far, and the details of this work are not yet at hand, as the parties are only just returning after a very successful season. The season was marred only by an outbreak of smallpox among the Indians which, as a matter of self-protection as well as for humanitarian reasons, engrossed the care and attention of the American Chief Engineer and his surgeon all summer.

The Survey is giving special attention to the publications, for the use of engineers, of the geographic coördinates, the descriptions of the trigonometric stations, and the leveling and magnetic results. The daily mail at the Survey office impresses one with the widespread and increasing demand for this information, and taxes the ability of the office to keep pace with it. Each division is in charge of an expert and the result is that the methods of the Survey compel the close attention and study of other nations and often serve as a model for them.

INVESTIGATION OF ILLINOIS SOILS

BY

CYRIL G. HOPKINS

The Agricultural Experiment Station of the University of Illinois has been engaged in the investigation of Illinois soils for about ten years. These investigations are conducted by soil surveys, by analyses of representative samples of the various types of soil found in the State, and by culture experiments which are carried on to some extent by pot cultures in glass houses, in large jars filled with different types of soil treated and cropped in different ways, and much more extensively by field experiments which are in progress on thirty-five different soil experiment fields, aggregating about 800 acres of land on representative soils in various parts of the State.

A general soil survey of the entire State was first made in which fourteen great soil areas were located, based upon soil formations, and one or more of the most important soil types found in these areas were investigated by ascertaining the stock of fertility contained in the soil and the results in culture experiments where deficient fertilizing materials were applied to the land. In this way much information was secured relating to twenty-five of the most important and most extensive types of soil in Illinois. This general soil survey has been followed by a detailed soil survey in which every type of soil on every man's farm is found and the boundary lines located on an accurate map.

This detailed soil survey is conducted by the State of Illinois without coöperation with the United States Department of Agriculture, and it has already covered thirty-seven counties, or more than one-third of the entire State. The publication of the detailed soil maps has been intentionally delayed in order that the chemical analysis, showing the total stock of fertility in each type of soil, might be completed, and more particularly in order that several years' results from actual field investigations might be included in the report in order to give it value and to carry conviction to the farmers and landowners concerning the importance and possibility of different methods of soil improvement.

The publication of these reports is now in progress. Report No. 1, "Clay County Soils," and Report No. 2, "Moultrie County Soils," have already been published and distributed. Clay County is one of the representative counties of a great area in Southern Illinois, known as the wheat and fruit belt, while Moultrie is a typical corn-belt county of the central part of the State.

An attempt was made ten years ago to coöperate with the United States Bureau of Soils in the detailed soil survey of Illinois, but the methods of surveying followed by the Bureau were so general and superficial in character that the work proved altogether unsatisfactory both to the Illinois Experiment Station and to the practical and progressive farmers of the State. A report of this coöperative report of Clay County, Illinois, was published in connection with the "Field Operation of the Bureau of Soils, 1902," reference to which shows that all of the upland soils of the county, aggregating about 85 per cent. of the total area, are classified as one type of soil, while Soil Report No. 1, "Clay County Soils," published by the University of Illinois Agricultural Experiment Station, March, 1911, shows eleven different types of upland soil. In a word, the report issued by the United States Bureau of Soils tells what crops are commonly grown in the county and gives soil analyses showing only the percentages of sand, silt, and clay, with no information concerning the stock of fertility; while the report published by the University of Illinois gives the total stock of every important element of fertility in every type of soil and also gives the results obtained from the addition of different kinds of fertility in different forms, especially in the most economical and profitable forms for use in permanent systems of soil improvement, including farm manures and the use of leguminous crops (which constitute the farmers' natural means of securing nitrogen from the inexhaustible supply in the air), ground natural limestone (which is not caustic in its action, does no damage to the soil, and which is the most economical form of lime to use in normal conditions), and either steamed bone meal (originally a farm product) or fine-ground natural rock phosphate, a still more economical form of phosphorus, which can be secured at sufficiently low prices from the nearby deposits in Tennessee to enable Illinois farmers and landowners positively to enrich their soils in that very important element. Magnesium is also supplied in natural dolomitic limestone, and potassium is liberated from the soil where the natural supply is essentially inexhaustible; or on certain abnormal soils, such as peaty swamp land, soluble potassium salts are used with large profit.

Several additional county soil reports are now in process of preparation, printing or lithographing, and hereafter the publication of the reports is expected to keep pace with the soil survey, which it is hoped will cover the remainder of the State within the next ten or twelve years.

SCOTT'S SECOND ANTARCTIC EXPEDITION*

BY

EDWIN SWIFT BALCH

On March 31, 1912, the *Terra Nova* returned to Akaroa, New Zealand, from her relief voyage to Captain Robert Falcon Scott's expedition in East Antarctica. The *Terra Nova* thus has come out of the Antarctic ice later than any ship heretofore, so late in fact that some students of Antarctic conditions had given up expecting her home this year. She brings back important news of Scott's work, and although the results can hardly be analyzed as yet except in a preliminary way, a brief summary of the work may be attempted.

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* The *Bulletin* has not printed an Antarctic chart with Mr. Balch's papers on the Amundsen and Scott Expeditions because it will not be possible to indicate their routes and the position of their discoveries till their maps are published. It is suggested that readers of these papers consult, for purposes of orientation, Antarctic charts such as are found in the last edition of the Century Atlas (Sheet 3½) or the charts in the Stieler, the Andree, and the E. Debes Atlases.

Scott sailed in the fall of 1910 in the *Terra Nova,* and after a voyage through Ross Sea, where he met Amundsen at the Bay of Whales, he landed with a strong party at McMurdo Sound. Here a basal winter camp was established, nearly in the same locality where he himself and also Shackleton had wintered before.

As soon as Scott was installed ashore, he proceeded south, starting on February 8, 1911, on a depot laying trip. This proved to be hard work. The snow surface of the Barrier was soft in places, and there were some heavy blizzards. In one of the blizzards two of the ponies succumbed. On February 16, in 79° 30′ S., Scott laid down over one ton of stores in a cache, which was called One Ton Camp. On their return, one of the dog teams went through a bridge on a crevasse, falling sixty feet. By sheer luck, none of the men went down, and only one of the dogs was killed.

On February 24, 1911, Scott and some others started again to lay down more stores. They encountered another tremendous blizzard, from which the ponies suffered severely. On their return some of the party were forced, on account of the tired condition of the ponies, to camp on some sea ice not far from the winter quarters. During the night the ice broke up and began to move. With infinite difficulty the sledges were dragged over the pack, the ponies jumping from floe to floe. Finally the party neared the Barrier, and Crean was able to climb up and go for assistance. With Alpine ropes the men and the sledges and their loads were pulled up on to the Barrier, but nothing could be done for the ponies, and three of the best were lost. From this occurrence as well as from the one mentioned before it may be inferred that ponies are not entirely suitable for Antarctic work. Another cause militating against their use is the fact that, when killed, they cannot be eaten by the other ponies, thus entailing a loss to the commissariat department of the gravest nature under Antarctic conditions.

Between January 27 and March 15, 1911, another party made a long scientific excursion to the westward. This party, consisting of Debenham, Wright, Evans, Griffiths and Taylor, is spoken of as the Western party. After laying down a depot at Cathedral Rocks near the Farrar Glacier, they sledged all about this neighborhood and then returned back by way of the Koettlitz Glacier, of which also they made a careful study. This party made some of the most important scientific observations obtained by the expedition, and these will be spoken of further in this article.

The winter was spent much in the usual way. The hut proved comfortable, and its arrangements for lighting, heating, ventilation, and cooking were eminently satisfactory. The stable for the ponies and the shelter for the dogs also worked well. Every one was fully occupied with scientific and station work, exercising animals, etc. A series of lectures was organized and football was played to within a month of midwinter. The average temperature at the station was below —40° F., at the lowest —50° F. The wind averaged 15 miles an hour, but sometimes blew hard with the temperature at —30° F.

During the winter a journey was made by Wilson, Bowers, Cherry and Garrard, to Cape Crozier to observe the incubation of the emperor penguins at their rookery. They started on June 27 and were absent five weeks. This first winter Antarctic journey taxed the men's powers of endurance to the utmost. On the Barrier the temperatures were seldom above —70° F., the lowest observed with a sling thermometer being —77° F. The storms were terrific. On one occasion a tent and other carefully secured articles were blown away, and, after straining for fourteen hours, the roof of the shelter hut flew to ribbons. In spite of the dangers, darkness, and cold, however, the party were able to reach the rookery, and to secure some eggs at different stages of development, which should give considerable information regarding the embryology of the emperors.

The so-called Northern party, consisting of Campbell, Levicky, Priestly, Abbott, Browning and Dickerson, was picked up on January 4, 1912, at Cape Adare by the *Terra Nova* on her voyage south. They were landed on January 8, at Terra Nova Bay. Hence they proposed to work due north between Mount Melbourne and the Nansen range proceeding as far as time allowed with the object of examining the extreme northeastern land plateau, both geographically and geologically. The *Terra Nova* on its northward voyage tried to take this party on board again but was not able to do so. They were provisioned and equipped, however, in view of this possible emergency arising, and are to proceed south, a distance of about 200 miles, to the winter quarters at McMurdo Sound.

Scott himself started south on November 2 or 12, 1912, bound for the South Pole. He passed the abandoned motors of the advance party which he caught up at 80° 30′ S. Evidently motor sledges have not developed as yet sufficiently to meet quite successfully the conditions of Antarctic travel. Although they dragged heavy loads over the Barrier and crossed crevasses in safety, yet the motors, although cooled by Antarctic zephirs, got overheated, and time and conditions did not permit of the defects being taken in hand.

After the return of the motor party, Scott pushed on steadily south over the Barrier, killing his ponies one after the other for food for the dogs. The weather was bad, snowstorms frequent, the sky continually overcast, and land rarely visible. On December 10, 1911, they were in 83° 15′ S., near Mount Hope, at the foot of the Beardmore Glacier. Traveling up this was terribly hard work. The lower reaches were filled with soft snow, into which men on foot sank in to the knee at each step. It was necessary to do all the pulling on skis. The runner surface of the sledges proved inadequate, and these frequently sank in to the cross-bars, requiring to be extricated with standing pulls. Working from ten to eleven hours, they could only advance about five miles a day. Higher up, the going became better, and the party made better time.

On December 21, they were in 85° 7′ S., 163° 4′ E., at a height of about 6,800 feet. On Christmas day they were close to 86° S., at a considerably higher altitude. On New Year's Eve, in 86° 56′ S., they made another cache, and the seamen of the party rebuilt the sledges with new short runners under the most adverse conditions. On January 4, 1912, the last return party under command of Lieutenant Evans, bade Scott farewell in 87° 35′ S., at an altitude of 9,800 feet, and left him struggling forward to the South Pole. With Scott were Dr. Wilson, Captain Oates, Lieutenant Bowers, and Petty Officer Evans. They had a month's provisions and were excellently equipped. They have doubtless, let us hope, after attaining the South Pole for the second time, long since returned to their winter quarters.

On the return journey of the last supporting party, which reached 87° 35′ S., Lieutenant Evans, commanding the party, developed a bad case, the only one on the expedition, of the much dreaded disease scurvy. Owing to the party being short handed, Evans was compelled to continue pulling the sledge. His condition became more serious daily, until finally he was unable to stand. His companions thereupon dragged him to within thirty miles from winter quarters, to which Crean then made a forced march alone, and brought back Dr. Atkinson. Evans' life was thus saved, but he had to be invalided back to New Zealand where he is now convalescent. It seems strange that with all modern medical knowledge there should still be danger of scurvy in the Polar regions. It is said to be a form of ptomaine poisoning, and doubtless comes from the canned food which unfortunately must, to some extent, still be resorted to.

Much scientific work and many observations were carried out by the various members of the expedition. Self-registering meteorological instruments have given a continuous record of the pressure of temperature within the neighborhood of McMurdo Sound. The upper atmosphere was investigated by means of small balloons, which have shown the direction of upper currents to a height of six miles and temperatures up to five miles. An almost unbroken record of magnetic elements was obtained, and absolute magnetic observations were made every week. All through the winter the aurora was observed every hour, but few brilliant displays occurred. Atmospheric electricity also was studied. Pendulum observations for finding the value of gravity were carried out, and a tide gauge has given a continuous record.

Geology has received much attention. Problems regarding the origin of Alpine topography when Europe and other temperate regions were undergoing the Ice Age, are being studied in the examples offered by retreating glaciers in South Victoria Land, where this age still obtains. Above the Farrar Glacier, Debenham discovered a distinct crater of the late glacial age, also late basalt flows eighty feet thick: confirmation of the already known fact that there has been much volcanic activity in Antarctica. In the same neighborhood, the western party passed at one place a fresh water lake, frozen only at the surface. They also found a valley, described as a dry valley, where the glacier had apparently melted away before the rays of the sun. Near Granite Harbor, specimens of bituminous coal were found, also by Debenham, which were almost certainly derived from a well marked outcrop of beacon sandstone on the nunatak. This coal is of economic value and appears to be the second find of coal in the Antarctic, the first apparently being that made by Mr. Wild of Shackleton's expedition, who in 85° S., discovered seams of coal from four inches to eight feet in thickness with sandstone intervening.

Near the Mackay Glacier numerous well preserved fossils, probably crustacean, were found, which in connection with the several finds of fossils already made in Antarctica, tend to show that at one time life was more abundant there than now.

Biological work has been carried on steadily. Much was done at a hole kept open in the sea ice during the winter, where minute organisms were observed. Parasites of seals, of penguins and other birds, and of fish have been studied. Some new protozoa have been found. On the *Terra Nova*, some trawling was carried out, through which a collection of the deep sea fauna of Ross Sea was made.

At Granite Harbor, thousands of wingless insects of two different species were observed clustering under the pebbles. The existence of insects in Antarctica was first revealed by Mr. Henryk Arctowski of de Gerlache's expedition, who discovered a tiny one in Gerlache Strait. The Borchgrevink expedition afterwards found three distinct types of insects at Cape Adare. Scott's party, however, is the first that has noticed insects in any numbers. It is not stated, however, what kind of insects they were, merely that they were half frozen. It would be of interest if they could be compared with the large red brown flies, nearly an inch long, which the Rev. G. F. Browne (*Ice Caves of France and Switzerland,* 1865, pp. 8, 42) saw running rapidly on the ice and stones of the Glacière de la Genolliere, and one of which he also found at the Glacière du Pré de Saint Livres, and which he was told was something very like the *Stenophylax hieroglyphicus* of Stephens.

An interesting zoological discovery was made at the Koettlitz Glacier. This drains off, like many mountain glaciers, through a stream flowing beneath glacier and moraine. But in this case it was found that seals proceeded up this subglacial river, and that their blowholes occurred at intervals along its course. It seems to be a new fact in natural history that seals sometimes go up a subglacial freshwater stream.

It is a lucky thing for science that Scott's expedition started when it did. After the discovery of the South Pole by Amundsen was announced, it would probably have been impossible to finance a scientific expedition to South Victoria Land. Scott's expedition, while not adding greatly to geographical knowledge, has certainly been most helpful to various other branches of science. It has been well handled under great difficulties, and from the scientific standpoint, it has been distinctly successful.

It seems well in this article to record the return of the Japanese expedition to the Antarctic under Lieutenant Shirase, in the *Kainan-Maru*. They left Sydney on November 19, 1911, and sailed straight to the Bay of Whales, where they landed a party and met the *Fram*. Thence they proceeded to Edward Land, where they landed another party, and then did some exploring along the coast. The two shore parties were then picked up and the *Kainan-Maru* returned to Wellington, New Zealand, on March 24, 1912. The details of the journey have not been published as yet.

There are some important facts, principally meteorological, on which the voyages of Amundsen and Scott have shed much light. These facts were known to some extent before now, mainly through the experiences of Nordenskjöld and Charcot. Probably they influenced Amundsen when planning his trip; at any rate they have profoundly affected the actual carrying out of the journeys of both Amundsen and Scott.

We know now that there are at least three great mountain ranges in Antarctica, that of South Victoria Land, that of Amundsen and Edward Land, and the Antarctic Andes of Eastern West Antarctica. These have the decidedly similar geographical characteristics of pointing in a general way from the neighborhood of the South Pole and of radiating towards the periphery of Antarctica much like the spokes of a wheel. Now the point to be noticed is that Scott wintered on the eastern slopes of the great mountain ranges of South Victoria Land, and Nordenskjöld on the eastern slopes of the Antarctic Andes. Amundsen wintered on the western slopes of the great mountain ranges of Edward Land and Amundsen Land, and Charcot on the western slopes of the Antarctic Andes. Nordenskjöld and Scott thus wintered in similar exposures; and Charcot and Amundsen likewise wintered in similar exposures. Scott evidently met extremely bad weather, heavy storms, blizzards, great cold, and Nordenskjöld had exactly the same experience. Amundsen, whilst noting some very low temperatures during the winter, speaks of but little snow and only two moderate storms, and this is much like what Charcot recorded. In other words, Nordenskjöld and Scott had frightful weather: Charcot and Amundsen had relatively good weather.

The inference is inevitable that this state of things prevails all over Antarctica and that the weather is more severe on the eastern slopes than on the western slopes of mountain ranges. Confirmation of this fact is even offered through occurrences noticed on Scott's own expedition. While the Western party was on the western slopes of the mountains surrounding the Farrar and Koettlitz Glaciers they had but little strong wind, although at Cape Evans very bad weather was experienced during the same period. Moreover, this fact tallies also exactly with the fact to which Dr. Hugh Robert Mill once called the writer's attention in a letter, namely, that the navigators who coasted along Antarctica from west to east had better sailing than those whose prows were pointed in the opposite direction.

From the journeys of Nordenskjöld, Charcot, Amundsen and

Scott, therefore, we may deduce with some assurance certain data about Antarctic weather conditions which must inevitably be taken into account in future voyages of exploration to the Antarctic regions. In fact, on the strength of these deductions, a guess may now be hazarded. Lieutenant Filchner is probably wintering somewhere under the lee of Coats Land. For aught we know to the contrary, there may be another range of mountains there pointing towards the South Pole: at any rate, it seems probable that Filchner will have better weather than either Nordenskjöld or Scott, and that this may aid him in breaking a new trail to the South Pole.

SOME GEOGRAPHIC RELATIONS ILLUSTRATED IN THE PRACTICE OF AGRICULTURE*

BY

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The geography underlying agriculture may be viewed from two contrasted viewpoints. The larger problem is of course to consider the distribution of crops in a unit area as related to the climate, surface features, soil, labor supply and markets. For instance, with the climate, surface features and soil all favoring the development of dairying in a given section, whether that dairying shall be for furnishing fresh milk or for making butter or cheese, depends generally on the character and accessibility of the market. The distribution of wheat in the United States is dependent very largely on certain conditions of climate and soil, and the distribution of maize for food is dependent on the same conditions but with varying ratio between the values of the determinants.

The more detailed relations between agriculture and physical conditions, however, are equally interesting and perhaps at first sight less obvious. They are none the less real and important, however. Some of these relations, as seen in agricultural practice in the eastern United States, form the basis of this paper.

Slope and Exposure. In any region of varied relief, with contrasted slopes and exposure to sunlight and wind, agricultural operations must be adjusted according to the slope conditions. The distribution of hand versus machine operations in plowing, tillage and harvesting is largely a question of slope, though in the glaciated section of New England, the stony and ledgy character of the soil determines in many cases the form of tillage operations. The persistence of hand work in plowing, cultivating and harvesting of crops, like corn and potatoes, in New England is due in part to the small average size of the farms and in part to the steepness and irregularity of the slopes.

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* Read before the Association of American Geographers, December, 1910.

Here in general we find the gentler slopes devoted to tilled crops, the steeper slopes to fruit and the rougher regions to pasturage, scrub land and forests. Cattle can more cheaply and profitably harvest the natural crops of land nearly covered with boulders and with steep slopes, than can man either by hand or machine labor.

In any rugged or even rolling region, the question of water drainage and direction and rate of ground water movement is a vital matter from the crop standpoint. Farmers now generally recognize the importance of drainage as related to well or spring water supply, to the building of storage houses and in similar matters, but few yet realize that there is, in any region of varied relief, an air drainage as regular and as easily determined as is the water drainage. Houses on hillsides, if with the right exposure, will enjoy more air movement, both by day and night in the summer, than those located on hilltops or in valley bottoms. Furthermore, the extremes of temperature in summer or in winter are less on hillsides than in valley bottoms. This is the factor generally recognized by extensive market gardeners who fear the effects of early frosts or low nocturnal temperatures on the lower slopes in rugged regions.

In the northeastern United States the prevailing winter wind is from some point of the northwest and the prevailing summer wind is from the southwest, except in narrow and elongated valleys, where the lower currents are more or less influenced in their direction by the alignment of the surface features. Few farmers, however, realize the persistence of wind directions and pay little attention to this matter in the location of farm buildings or houses.

The question of exposure to sunlight is an important matter in gardening and fruit culture. In small gardens with many different crops, some naturally tall and some low in height, the rows should run north and south so that the tall crops will not shade the lower-lying plants, except for a few hours in the day. Plants raised in north and south rows will grow more symmetrically than those raised in east and west rows, because the plants receive equal hours of sunlight on both sides and, furthermore, during the hottest hours before and after noon are less exposed to the intense sun's rays than they would be if planted in east and west rows.

Similarly the matter of exposure to sunlight explains why the best fruit is usually found in the higher parts of a tree, and why the next best is found on the south and southwest sides.

It is a commonly recognized principle that early and less hardy fruit trees should, in the Northern Hemisphere, be planted on north facing slopes, because such slopes are nearly tangential to the sun's rays during the midday hour, or may even be in the hill shadow while southern slopes may be nearly perpendicular to the sun's rays. Hence south slopes favor the early starting of trees, while northern slopes retard it, an important consideration in fruit culture in regions where the temperature may rise unseasonably high in the winter months and thus prematurely start the sap in delicate fruit trees.

Shade trees on the south side of tilled fields, though they may have their artistic value, are economically an unwise investment because of the effect of shade during the hours of the growing season, between 6 A.M. and 6 P.M. Field crops planted in the shade of east and west rows of trees are rarely successful, but those in the shade of north and south rows are somewhat more successful, for the influence of the shade is felt for less hours. Gardens sheltered from early morning sun, however, are always backward and disappointing.

The question of exposure is also a vital matter to be taken into consideration in the construction of farm outbuildings, as is recognized in certain cases. Cattle yards, sheep yards and hog runs ought naturally to be on the south side of buildings, or windbreaks, and at the same time protected from the northerly and westerly fair weather winter winds. Protection from the northeasterly and easterly winds is less significant, because these are usually storm winds, and stock will be kept under cover during storms.

The alignment of cow barns, horse stables, hog houses and hen houses ought to be considered from the standpoint of sun as well as wind exposure. Cow barns, planned for a double row of animals, should run in a north and south direction, so as to get the advantage of both the east and west exposures to sunlight. Henhouses, as ordinarily constructed, should run east and west so as to bring the scratching floors on the south side. Hog houses and cattle barns should be constructed so as to have the windows at the proper height, according to latitude, for securing the maximum amount of sunlight in the short days of midwinter. Improperly placed windows may cut off all the sunlight from the stock or pens, when a proper consideration of the height of windows above the base line will throw the sun's rays where they are of most value. Some breeders of hogs prefer to have their windows adjusted so as to throw the light into the pens about the times of the equinoxes, which are the farrowing times for hogs.*

The much debated question as to whether it is desirable to have cattle in a double rowed stable face inward or outward, is not usually considered sufficiently from the standpoint of exposure to sunlight. Cattle facing inward in a north-south barn, with windows properly adjusted as to height, will receive the sunlight on their bodies rather than their heads and will not have their eyes exposed to such a strong glare as will animals facing outward. The question of exposure to light is equally important in horse stables, but usually horses are made to face the windows, an unfortunate arrangement from the standpoint of eyesight, warmth and comfort, particularly in the winter months.

Seasonal Weather Conditions. In general, successful crops during any year are roughly declared to be the effects of good weather and bad crops of bad weather, but few stop to analyze the special seasonal conditions that affect the crops or to consider what extremes of weather may be expected and whether the farmer can in any way be forearmed to meet such conditions.

Any locality is limited in its crop variety by the length of the growing season, which extends, for the main crops, from the date of the last killing frost in the spring to that of the earliest frost of autumn. Of course the length of the growing season varies with the latitude, altitude and position of a given region in reference to the ocean. Some years the growing season is several weeks longer than usual and in others it is shorter than the average, but the main crops in general are planted at about the same time each year and harvested at about the same date.

But the quality of a crop, and the quantity as well, are largely determined by possible variants within the growing season established on the basis of temperature alone. The seasonal distribution of sunshine and cloudiness may have a large effect on crops, and can not be anticipated or guarded against. The growth of corn, for instance, requires warmth and moisture directly following planting, but the character of the crop is determined by the daily temperature and sunlight during the season of rapid growth, previous to the blooming of the corn. A warm July and August with an abundance of sunlight means taller stocks, better setting of ears and a large yield, while a cool and cloudy period at this season means the reverse. Warmth and moisture at or just after the season of blooming of potatoes means, as a rule, that more tubers will set and mature. A dry season at this time, no matter what the conditions during the rest of the season, means a light crop. Similarly the saying, "A wet May means long hay," has its truth, for plenty of moisture in the season of maximum growth followed by clear skies and seasonable temperatures, means not only a heavy crop of hay, but an early maturing crop and the right conditions for harvesting in the best condition.

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* For fuller consideration of this question, with tables showing height of windows for different seasonal exposures and different latitudes, see *Farmers' Bulletin*, 438 U. S. Dept. of Agric.

A dry summer, immediately following the haying season, is unfavorable for the renewed growth of the grass, makes summer seeding of hay lands uncertain in results and causes a great loss of ground water from the soil by evaporation, because of the lack of a vegetation blanket on hayfields that would retard the rate of loss of ground water. Many other illustrations might be given of this intimate relation between sunshine, cloudiness, distribution of rainfall and success of crops.

Changes of weather conditions also affect animals in many ways worth noting. In the summer months where dairy cows are pastured in the ordinary wild pasture, they have to keep working to get as much food as is necessary for the greatest efficiency. Ordinarily cows will eat most freely in the early morning, in the late afternoon and on moonlight nights, if the weather is of the ordinary temperature and humidity. But on over warm and over humid days, cows will seek shade, and will not eat until driven to do so by hunger, and then they will eat sparingly. The indirect result of the excessive humidity is at once seen in the reduced flow of milk.

The same thing is true in the winter when cows are stalled and their food supply is regulated and constant. Where twice daily records are kept of the output of individual members of a herd, it will be found that the herd as a whole, and nearly every individual, will vary in amount of milk produced according to weather conditions, when the amount of food, the care, and other surrounding conditions are kept as nearly as possible unchanged. There seems to be a very direct relation between milk flow and excessive humidity, at both high and low temperatures. The flow will decrease more at times of severe cold and high percentage of humidity, than when the humidity is low and the temperature unusually severe. This is probably due to the well known fact, experienced by us all, that it takes more energy to keep warm on cold, damp days than on much colder, dry days. In consequence of this extra demand on the energy of the cow to keep warm, there is less energy left for milk producing. Changes of humidity and temperature also seem to affect the efficiency of other animals, but it is not as easy to measure the results quantitatively, as is possible in a dairy herd.

Ground Water. The one element that is most vital to most crops is of course the ground water, whether it is at a high or low level and whether it can be supplied at the necessary rate for the growth of a given crop. The amount of water needed by various crops differs, and the depths from which crops can secure ground water also vary. Alfalfa, for instance, is deep rooted and especially adapted to countries where the ground water level is low. It is developed, therefore, with difficulty in heavy soils so situated that the ground water level is near or at the surface during many months in the year. Corn on the other hand is shallow rooted and the level of the ground water must be kept within reach of the roots. Hence the necessity of more tillage for corn and similar crops in dry seasons than in moist seasons. The methods of dry farming give any farmer the rule to adopt in crop management during dry seasons.

If the ground water level tends to lower, it must be retained near the surface by mulches or tillage. Conversely, if the ground water tends to remain too near the surface so that the land becomes saturated and cold, rolling and packing of the soil must be undertaken in order to increase the rate of evaporation from the surface of the ground.

The level of the ground water will rise in the autumn after a dry summer, without any rainfall because of the decreased evaporation with the lowering of the angle of the sun's rays. On this fact often depends the raising of the level of wells, the germination of fall cover crops and similar phenomena. Tillage is largely a question of maintaining suitable ground water conditions although it is not usually so considered. The method of tillage must therefore vary with the character of the season, and crops should be planted in soils where the physical conditions favor an average ground water level adjusted to the crop needs. In case of departure from mean conditions, systems of tillage must be adopted to counteract the unusual conditions.

Successful crop raising is largely a question of soil and ground water management in which, as has been illustrated by these scattered instances based on experience, geography has a large place, whether the geographic relation is so recognized or not.

RALPH STOCKMAN TARR

This well known American Geographer, Professor of Physical Geography at Cornell University, died very suddenly on Thursday, March 21, 1912, from cerebral hemorrhage. He had been indisposed on Wednesday of the preceding week from a cold and sore throat; but had so far recovered by Sunday as to be able to take dinner with Ithaca friends. On Monday, however, there was a relapse and other complications set in. His condition grew steadily worse from then on, though no fatal termination was looked for on Thursday morning. The end came with appalling suddenness on Thursday afternoon.

Professor Tarr was born in Gloucester, Mass., on Jan. 15, 1864. He received a public school education, entered Harvard University and was graduated from the Lawrence Scientific School of that institution in 1891, with the degree of B.S. In 1892 he married Kate Story. In the same year he was appointed Assistant Professor of Geology at Cornell University, and in 1896 was given the full professorship in Dynamical Geology and Physical Geography. Later, in 1906, he was made head of the Department of Physical Geography; and at the time of his death his title was that of Professor of Physical Geography. He is survived by his father and mother, his wife and two children, a son, Russell, now a freshman at Harvard, and a daughter, Catherine; and by a brother and three sisters.

Professor Tarr had won international recognition as a scientist and author by his research work in the field of geology and geography. His especial study was Glaciology and the Phenomena of Continental Glaciation. In connection with this work he early led an expedition to Greenland (1896) and more recently was the leader of four expeditions to the Alaskan glacier regions, to the last of which he devoted the summer of 1911, the previous ones the summers of 1905, 1906 and 1909. The first of these Alaskan expeditions was for the United States Geological Survey, but received part support from the American Geographical Society of New York; the second was wholly for the United States Geological Survey, and the last two were under the auspices of the National Geographic Society of Washington, D.C.

The results of this, and other work carried on by him, are, in part, embodied in a list of papers, monographs, and books, which will be printed when it is made more complete. Perhaps the most comprehensive paper on his glacial work is a Professional Paper of the United States Geological Survey entitled: "The Yakutat Bay Region, Alaska." He had a number of other papers in process of publication at the time of his death, the entire proof of one of which, another Professional Paper for the United States Geological Survey, entitled "Alaskan Earthquakes," had just been finally read and corrected by him at the time of his death. Professor Tarr was early an advocate of the effectiveness of glacial erosion, and his work on this topic, especially in reference to the geography and physiography of finger lake regions, has a classic significance.

In addition to the fame achieved by his research work Professor Tarr had also won renown as an educator and author of geography texts. His latest work of this nature, the "New Physical Geography," published in 1904, has secured a very wide acceptance in American schools.

He was an associate editor of the *Bulletin,* of the American Geographical Society and of the *Journal of Geography,* and was last year President of the Association of American Geographers. He was also a Foreign Correspondent of The Geological Society of London, and on Feb. 27 of this year, the Royal Geographical Society of Vienna conferred a similar honor upon him. Of this last honor he never knew, as the certificate reached Ithaca after his death. He was a member of The Geological Society of America and of Sigma Xi.

Taken in the prime of life (he was only 48 years of age), his death occasions a very great loss to the scientific world. His life had been spent in the acquisition of a very wide knowledge and experience in his subjects by exploration, travel and reading; and he was just entering on what would have been the time of his ripest productivity. Though science mourns him greatly, his scientific colleagues find in his untimely death an even greater grief in the irrevocable loss of a true and loyal friend and a very dear comrade. His personality was frank and delightful; he gave practical help to everyone with whom he came in contact; and to know him was to receive inspiration. To the younger men who grew up under his training he was over-generous in giving credit for work done under his guidance. Himself an indefatigable worker, he set for his students an example of industry and scientific activity difficult to emulate, but an ideal to be striven for. O. D. von Engeln,

Cornell University.

Professor Tarr, for many years, had been a valued contributor to the *Bulletin.* Among his publications, numbering nearly 200 titles, were many physiographical notes in our "Geographical Record." His "Physical Geography of New York State" was undertaken at the request of this Society, parts of it appearing in Volumes 28-31, before he published these papers, somewhat extended, in book form. (The Physical Geography of New York State; with a Chapter on Climate, by E. T. Turner, 396-7 pp. Maps, figs. New York, 1902.) In 1905 he received a grant from the Society to help him carry out, in conjunction with Lawrence Martin, research work at Yakutat Bay, Alaska, the results of which were published in two papers in Vol. 38 of the *Bulletin*, under the title, "Observations on Glaciers and Glaciation at Yakutat Bay, Alaska." Among other notable papers from his pen appearing in the *Bulletin* was "Decline of Farming in Southern-Central New York," which attracted much attention. It is expected to publish later in the *Bulletin* a fuller statement concerning his scientific writings.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

The March Meeting of the Society. A regular meeting of the Society was held at the Engineering Societies' Building, No. 29 W. 39th Street, on Tuesday, March 26, 1912, at 8.30 p. m. The Chair was occupied by Councillor Levi Holbrook.

The following persons, recommended by the Council, were elected to fellowship:

Percy Herbert Ashmead,
Hugh P. Baker,
L. A. Bauer,
John I. D. Bristol,
Charles P. Bonnett,
Newton H. Harding,
George F. Kunz,
Frank B. Mackay,
Willis L. Moore,
Hermann Norden,
James McAlpin Pyle,
William G. Reed.

The Chairman then introduced Lieutenant Charles F. Gammon, formerly of the U. S. Consulate in China and the Chinese Imperial University, who addressed the Society on "China." The lecture was illustrated by numerous lantern slides and was enjoyed by an audience that filled the Auditorium. On the adjournment of the Society the audience had an opportunity to meet the lecturer in the lower hall.

NORTH AMERICA

Oil and Gas Resources of Tennessee. In its November number, *The Resources of Tennessee*, published monthly by the State Geological Survey of Tennessee, says that the Survey and the U. S. Geological Survey will cooperate in studies of the oil and gas resources of the State. Drilling is now going on in several districts and favorable showing of oil has been reported from many fields.

Potash Found in the Mohave Desert. A large deposit of potash salts in the Mohave Desert of southern California has been reported by field men of the United States Geological Survey and the Bureau of Soils. Analyses of the brine in Borax or Searles Lake, in San Bernardino County, show 6.78 per cent. of potash, and the amount of the material available is known to be enormous. The potash, it is believed, can be used as fertilizer without employing any special reduction process, and the climatic conditions of the area are especially favorable to its separation and recovery by solar evaporation. Borax Lake is the last remaining pocket of a great ancient lake, which has almost dried up, thus concentrating a vast amount of saline minerals. Millions of tons of salt, soda, and borax cover the surface of the lake and deposits of soda and borax have been worked, but the development of the potash in the lake deposits had not been considered until recently.

Iron Ore Reserves of Michigan. This is the title of an advance chapter by C. K. Leith, from "Mineral Resources for 1911," U. S. Geol. Surv. The report shows an estimated reserve in the mines of 124,598,164 long tons of high-grade ore—that is, what is known under present mining conditions as commercial ore—and of 44,982,938 long tons in drilled areas, or a total reserve of 169,581,102 long tons. The general conclusion of Dr. Leith's report is that at no time in the past has the outlook for long life for Michigan ores been any better assured than it is now.

Rapid Growth of Regina. A decade ago the present capital of Saskatchewan contained only a few hundred inhabitants. Regina is a good illustration of the rapid growth of some new Canadian towns. It is now a busy city of 30,000 inhabitants. It stands at the crossing of two great railroads. Buildings to the value of $5,000,000 were erected last year and it is said the building movement this season will be still greater. Over $1,000,000 has been expended on street and other improvements, the electric street car system, now seven miles long, is owned by the city, and the water works, now developing, will supply enough water for a population of 100,000 people. Regina is becoming a very important distributing center and its sales of agricultural machinery, amounting last year to nearly $5,000,000, have never yet been equalled by any other Canadian city.

Railroads in Alberta. The Trade Commissioner for Canada reports that the government of Alberta has planned to guarantee bonds for the construction of 1405 miles of railroad to be built by Canadian Northern Railway Branch Line companies. These guaranteed lines of railroads will cover Alberta with a net work extending from Fort McMurray, on the Athabasca River, in the East, and Peace River Landing, on the Peace River, in the Northwest, to Pincher Creek in the Southwest and the international boundary south of Medicine Hat. (*Bd. of Trade Jour.* No. 798, March 14, 1912, p. 589.)

New Farm Lands in the Peace River Valley. The Canadian Government has surveyed and thrown open an area in the Peace River Valley, thirty-four miles long by twenty-four wide. The region is declared to be one of the best agricultural districts in that valley. Its nearest railroad point is Edson on the Grand Trunk Pacific Railway, which is now the largest station on the line west of Winnipeg.

THE TWENTY-FOOT TERRACE AND SEA CLIFF OF THE LOWER ST. LAWRENCE. Professor James Walter Goldthwait writes (*American Journal of Science*, Oct. 1911), that this terrace and sea-cliff is not only the best cut and sharpest of all the elevated beaches and sea-cliffs on the upper Saint Lawrence, but the only sharp and well-cut one. Each of the other beaches—and they occur all the way up to 630 feet above the river—is so slightly marked that we must suppose that the warping uplift was steady and without pause from the time the ice began to draw away from the region to the date of the twenty-foot cliff. This Prof. Goldthwait christens the Micmac. It is strong because it was cut during a long, slow submergence, which gives the sharpest possible cliff-cutting, just as occurs in the Nipissing beaches of the Great Lakes. The paper shows the advantage that Goldthwait possesses in his wide as well as close study of lake shores. He finds that a similar interruption of emergence by depression has been made out in Scandinavia, which may be contemporaneous with this in America.

MARK JEFFERSON.

THE NEW PORT OF PRINCE RUPERT. The *Canada Gazette* for March 30, contains a proclamation announcing the establishment as a public port of "all the waters of Prince Rupert Harbor, including Tuck Inlet, Lake Wainwright, and the Porpoise Harbor with connecting and tributary waters." Prince Rupert is the terminus on the Pacific of the Grand Trunk Pacific Railway.

SOUTH AMERICA

RUBBER INDUSTRY IN BRAZIL The competition of the rubber plantations of the East Indies has been so successful that extraordinary measures will have to be taken to keep the industry on its feet in the Amazon basin. The Brazilian Government proposed to waive the import tax on all implements used in extraction of rubber, to provide prizes for the establishment of new plantations, to found experimental farms in almost every province, to give free instruction and free seed to all interested in rubber culture, and to grant subsidies for the installation of factories for the manufacture of pure rubber at Manaos and Para (*Daily Consular and Trade Rept.*, No. 19, Jan. 23, 1912). These plans may not be realized for some years to come, but it is of great importance to know that big projects are under way, for if the Government takes the same paternal attitude toward the rubber industry that it has given to the coffee and sugar industries and the related question of immigration and colonization, we shall soon see fundamental changes. It is planned to grant subsidies for railway construction and to build a series of roads in strategic positions to supplement the present system of fluvial transportation. Steamers will be put on many rivers and coal depots established at inland points. The Government will undertake direct colonization, hold a triennial exhibition at Rio de Janeiro, and make a reduction in the, at present, very burdensome export tax on rubber.

ISAIAH BOWMAN.

FUEL RESOURCES OF THE CENTRAL ANDES. The lofty semi-arid plateaus of the Central Andes have many resources of great value to men, though, up to the present, modern business has suffered because of the absence of a native coal supply. Recently there has been reported (*Daily Consular and Trade Report*, No. 35, Feb. 10, 1912) an apparently large and rich coal deposit near Lake Titicaca. The fact that the greater percentage of the fuel used at the present time is brushwood and llama dung and very expensive coal, lends great interest to the reported discovery. Coal is now imported from Wales, New South Wales, Australia, and from Germany and Belgium. This is true even of the coal used by the Pacific Steam Navigation Company's steamers, though the newly organized Peruvian Steamship Company buys its coal at Panama. Oil deposits of possibly great value have also been discovered north of Lake Titicaca, and, from reports gathered during the past year, there is a possibility that its development will not be long delayed, since the ease with which it may be handled gives it a great advantage over coal. Reports of coal deposits on the west flank of the Andes in northern Chile east of Tacna and near the line of the new railroad from Arica to La Paz, have also been received and some of this coal on examination proves to be of sufficiently high grade for steamship and railroad use. While coal deposits have been reported from several points in Peru, none has yet been discovered in Bolivia, so that from the standpoint of that country the Tacna and Titicaca reports have special interest. ISAIAH BOWMAN.

POLAR

THE CROCKER LAND EXPEDITION. The Steam Whaler *Diana,* a barkantine of about 500 tons register, has been chartered to carry the Crocker Land party to the south side of Bache Peninsula (Flagler Bay) or as near it as the ice will permit (*Bull.* March, 1912, pp. 189-193). Purchases of supplies and equipment are now in progress on the basis of providing food for five or six men for three years. The largest single items of food supply are 14,000 pounds of pemmican and 35,000 pounds of dog biscuit. The latter will be used at winter quarters instead of the whale meat provided by earlier expeditions.

A full photographic outfit is included. Among the instruments to be taken are barographs, thermographs, anemometers, etc., in addition to the ordinary instruments for determining geographical position. The surgeon and the scientific assistant have not yet been selected. While it may now be definitely announced that the expedition is going this year, all the money needed has not yet been secured and additional subscriptions are earnestly desired.

POLAR MEETING AT THE AMERICAN MUSEUM OF NATURAL HISTORY. The American Museum of Natural History and the American Geographical Society celebrated in the auditorium of the Museum on the evening of April 5, the attainment of the South Pole by Captain Amundsen, the third anniversary of the achievement of the North Pole by Rear-Admiral Robert E. Peary and the recent inauguration of the Crocker Land Expedition. A very large audience listened to speeches by President Osborn of the Museum, Vice-President Greenough of the American Geographical Society, Rear-Admiral Peary, representatives of the Philadelphia and National Geographic Societies and others. An interesting feature was the presentation to Admiral Peary by the Peary Arctic Club of its medal of honor.

A REMARKABLE SUMMER JOURNEY IN ARCTIC SEAS. A letter was read at the meeting of the Real Sociedad Geografica on Nov. 14, 1911, from Señor D. Francisco Gisbert [a summary of his plans is in the *Bulletin,* 1911, p. 859], giving a short account of his voyage in Arctic seas last summer. (*Bol.* R. Soc. Geogr., Vol. 9, pp. 41-47, Madrid, 1911.) On July 1 his party sailed from Tromsö headed for Jan Mayen. Ice was met, a few days later, forty nautical miles east of Jan Mayen. This was recorded as an unusual extension for that season. A few days were spent at Mary Muss Bay and excursions were made inland. Señor Gisbert says that in the four years since his last visit many changes due to the volcanic nature of the island have taken place. The lake near Great

Wood Bay, which was six kilometers wide, had totally disappeared. The land was found to be ten meters higher above sea-level.

On leaving Jan Mayen the expedition sailed towards Shannon Island, on the east coast of Greenland above 75°. The enormous quantity of ice proved to be a serious obstacle to the trip. The explorer says he never saw so much ice in July and the conviction grew on him that he would not reach the coast. However, on July 27, after continual struggle with the ice, the coast of Greenland as well as Sabine Island south of 75°, were sighted. Owing to arrangements made for the party's return to Tromsö on Aug. 10 at the latest, no attempt was made to land. Tromsö was reached on Aug. 4.

Señor Gisbert left Tromsö again on Aug. 14 for the North. Ice was met in 75° 30′ N. The southern islands of Franz Josef Land were sighted twice, but thick ice prevented landing. The explorer finally succeeded in following an open channel which led to Cape Flora, and Jackson's station there was visited. The outlook from the summit of a nearby mountain showed favorable conditions for an attempt to cross Miers Sound and attain the British Channel. In this channel the party found an unmapped island, the bearings of which were determined. The island is a half mile long and 500 meters in width. Details as to its exact location, formation, etc., are promised by the explorer. The British Channel was followed nearly to 81°. No attempt was made to reach Teplitz Bay (81° 47′ N.), on account of weather conditions and, furthermore, ice was forming rapidly. It was decided to return by way of De Bruyne Sound. On leaving this passage it was found that ice conditions permitted extending the trip somewhat and the ship was headed East towards Wilczek and Salm islands. Hardly had the former been attained, however, when a severe snowstorm forced the ship south. Much difficulty was experienced in getting out of the ice. Finally open water was reached near 77° N. and Norway was attained on Sept. 10.

This was certainly an unusual trip for a season of rather poor ice navigation. To have reached nearly 81° N. in Franz Josef Land, to have spent some time on Jan Mayen in the same month that the Duchess of Bedford's party was prevented by surf from landing (*Geogr. Journ.*, Vol. 38, Nov., 1911, p. 537) and about a month earlier than the vain attempt of the Stackhouse Expedition to land in Mary Muss Bay, defeated, as it was, by heavy seas (*Bull. Amer. Geogr. Soc.*, Vol. 43, Dec., 1911, pp. 881-890), and to steam within sight of the East Greenland coast and back to Tromsö, all within two months and ten days and in spite of very bad ice on the Greenland trip, make a series of achievments worth recording.

A NEW GREENLAND EXPEDITION. Captain Koch, who was with the Mylius Erichsen Expedition in 1906-08, will lead a party to Greenland this year and will attempt, in 1913, to cross the inland ice from the east to the west coasts. The expedition expects to land at Königin Luise Land, an ice-free stretch of the coast about 90 miles north of Cape Bismarck. The inland ice does not extend to the coast here, but is held back by high mountains so that the comparatively wide coastal strip is richer in plant and animal life than any other part of the east coast, as far as known. It is expected to make thorough studies in this region and in the spring next year to begin the march over the inland ice with the design of penetrating to Lachsfjord near Upernivik on the west coast. The journey of about 630 miles will be across one of the broadest parts of Greenland and is expected to take from two to three months. (*Geogr. Zeit.*, Vol. 18, 1912, No. 3, p. 171.)

Russian Trading Post in North Novaya Zemlia. An article by B. I. Sadovski (*Izviestiia* of the Archangel Society for the Exploration of the Russian North, Vol. 4, 1912, Nos. 1-4), says that a new settlement was founded on Novaya Zemlia in 1910. As the Russian government is anxious to strengthen its authority on these islands, particularly to protect the northern island from the encroachment of foreigners, it appropriated funds for the establishment of a trading post in Cross Bay, 74° 10′ N. Lat. The erection of a large house, a chapel, and a bathing pavilion began in July, 1910. The colonists—Russian peasants, eleven in all—are supplied with food, boats, fishing implements, firearms and clothing. This is the first Russian trading post on the northern island and the fourth settlement on Novaya Zemlia, with 103 inhabitants all told. The colonists showed good results in 1910. Merchants from St. Petersburg and Moscow were invited to attend the sales; particularly high prices were realized on arctic fox and bear skins, and the total amounted to over $10,000.

H. de H.

PHYSICAL GEOGRAPHY

The Cyclonic Unit in Rainfall Observations. The usual method of observing and of averaging rainfalls, by days, months and years, while it has its obvious advantages, is from many points of view unsatisfactory because it does not show causes and conditions of the rainfalls. In the greater part of the so-called "temperate" zones the study of the amounts of rainfall which occur in connection with different individual cyclones makes the whole subject far more vivid and also far more rational. In a given month we have a rainfall below the normal. In another month we have a rainfall well in excess of the normal. What caused the difference? The usual monthly summary simply shows the fact. A study of the rainfalls of these two months by cyclones shows at once that the difference in the two cases was the result of a difference in the number, or tracks, or intensity, of the cyclones which brought the rainfall.

In a paper on "The Cyclonic Distribution of Rainfall in the United States" (*Monthly Weather Review,* Oct., 1911), William G. Reed, of the University of California, has published the first general study of this kind for the United States. Previous investigations in this country along similar lines have been made by Loomis, by the New England Meteorological Society, and by others. The author gives a brief account of what has been done by others in this direction, particular attention being paid to the excellent maps and discussions of cyclonic rainfalls in Great Britain published by Dr. H. R. Mill. The method of work in the present case was to enter, on a blank map, the sum-total of the daily amounts of precipitation due to a given cyclone as the depression moved across the United States, and then to draw isohyets for "trace," 0.5 inch, 1.0 inch, and 2.0 inches. Sometimes higher values than 2.0 inches were used. The maps, when completed, show the amount and the distribution of precipitation by cyclones. Considerable difficulty was naturally experienced in separating different cyclones, in dealing with thunderstorm rains, and in other matters. Yet, in spite of these handicaps, and in spite of the fact that the data studied covered only a comparatively short period of time and are obviously far from complete, the results of the investigation are important. The irregularity in the distribution of the heavier and lighter rainfalls is a very striking feature, as shown in several selected typical charts. It would be well if such a study could be carried much further, to cover a long period of years, based upon the daily rainfall records of the thousands of volunteer observers of the Weather Bureau, and if the causes of the "patchy" distribution of rainfall could be worked out. This paper is along new lines for this country, and is, obviously, only a beginning.

R. DEC. WARD.

MAGNETIC SURVEY WORK OF THE CARNEGIE INSTITUTION. The magnetic survey vessel *Carnegie*, left Manila on March 23, under the command of W. J. Peters, bound for Suva, Fiji, whence she will proceed across the Pacific to San Diego, Cal., arriving there towards the end of June. From San Diego the vessel will go to Tahiti, crossing the tracks of the former vessel, the *Galilee*, and filling in gaps; next to Coronel, Chile, then around the Horn. Finally, after having completed the general survey work in the South Atlantic Ocean, she will return to New York towards the end of 1913.

Magnetic Observer Kidson is now making magnetic observations in the western part of Australia in continuation of the general magnetic survey of Australia. Mr. J. P. Ault was placed in charge of a South American party, consisting, besides himself, of Donald Mackenzie and H. R. Schmitt. The party left New Orleans on March 30 and will make magnetic observations chiefly in Peru, Bolivia, Paraguay and Uruguay. Magnetic Observers W. H. Sligh and D. W. Berky are carrying on the general magnetic survey of the northwestern part of Africa. In connection with the total solar eclipse of Oct. 10, 1912, the belt of totality of which passes through Ecuador and Brazil, arrangements are being made to have two or three parties at suitable points along the belt for magnetic and electric observations during the time of the eclipse.

PERSONAL

PLANS OF SOME AMERICAN GEOGRAPHERS FOR THIS SUMMER. Avard L. Bishop, of Yale, intends to travel in Western Canada to study the agricultural resources of the three prairie provinces and to collect information on marketing crops and other matters of commercial and economic significance.

Isaiah Bowman, of Yale, will be in New Haven until Aug. 15, working up the geological and geographical data of the Yale-Peruvian Expedition and writing his report on it. Later, he will accompany the Transcontinental Excursion of our Society.

Robert M. Brown, State Normal School, Worcester, Mass., includes in his summer programme the study of shorelines, particularly in reference to shore drifts along Narragansett Bay, Martha's Vineyard, etc.

Frank Carney, Denison University, O., will continue his field work for the Ohio Geological Survey, mapping the old shorelines of the ice-front lakes. The survey is doing this work in great detail. Mr. Carney has mapped the raised beaches from the Pennsylvania State line west to near Leipsic. He has given three seasons to the study of these old shorelines and their geographical interpretation and the work will occupy at least two more seasons.

G. C. Curtis of Boston, will probably continue his studies of the Atlantic coast line which he began fifteen years ago with the discovery of ancient sea margins on Monhegan Island, coast of Maine. During the past two summers the coasts of Nova Scotia, Cape Breton, and southern Newfoundland were studied in detail.

Richard E. Dodge of Teachers College, Columbia University, will take part in the Transcontinental Excursion.

N. M. Fenneman, University of Cincinnati, has completed the pleistocene and economic portion of the Cincinnati Folio for the U. S. Geological Survey. Dr. E. O. Ulrich is doing the paleozoic work and as soon as his task is completed the Folio, which will be a very large one, will be published. Mr. Fenneman is now engaged on the Hamilton-Mason (double) Folio, which covers the area next north of the Cincinnati quadrangles. He will be a member of the Transcontinental Excursion.

J. Paul Goode, of the University of Chicago, will give two courses in the summer school at that institution, one on the economic geography of our country and the other on the economic geography of Europe.

William H. Hobbs, professor of geology at the University of Michigan, has been appointed by President Hutchins to represent the University at the 250th anniversary of the Royal Society of London, which will be held from July 16 to 18. Prof. Hobbs has leave of absence for the school year 1912-1913. Prof. E. C. Case will have charge of the Department of Geology. Mr. Hobbs's classes in geology will be conducted by Frank Carney, of Denison University. Mr. Hobbs will devote the year to study and travel abroad. In his field studies this summer he will pursue especially two lines of investigation: One of these is concerned with the nature of weathering at the bottom of the Bergschrund of Swiss glaciers, and the other, to the relation between relief of the land and joint structures. For the latter study he intends to visit Malta, the Balkan Peninsula and the Egyptian Desert.

George D. Hubbard, of Oberlin College, will lead a party of students into Western Virginia, where New River cuts through the Appalachian Mountains. The rocks from the Cambrian to the Mississippian, fifteen formations in all, are exposed in this neighborhood, and large and small faults, mineral deposits, and zinc, lead and copper mines may be studied by the students.

Ellsworth Huntington arrived in Havana, Cuba, from Yucatan early in April and expects soon to return to New Haven. He had written earlier that he hoped to spend six or seven weeks in Mexico visiting certain ruins and enclosed lake basins, among them that in which the City of Mexico lies. When the city was founded it contained a lake that has been drained by the digging of a tunnel. He desired to study the old strands of the lake and any features indicative of former expansion. Later he hoped to go further south to study the large terraces that are said to flank many valleys on the dry, west side; also to get some idea of the ruins at Oaxaca and Mitla, especially to see whether terraces had in any case been formed since their construction. From Mitla he planned to cross the Isthmus of Tehuantepec and go by land to Yucatan. There he would examine the great ruins of the Mayas to see how far their physiographic conditions are like those of Mitla. This summer he expects to spend June and July among the Sierras, making further measurements of the rate of growth of the Big Trees. He will take a machine for boring horizontal cores from the trees and, if it works successfully, will be able to bring back sections from living trees.

Douglas Wilson Johnson, Assistant Professor of Physiography at Harvard University, has been appointed Associate Professor of Physiography at Columbia University. He is now spending a half year in Europe and will begin his service at Columbia by giving two courses on Geography in the Summer School, which will open in July.

Walter S. Tower, of the University of Chicago, sailed from New York, on March 20, for South America, where he intends to spend six months studying the economic geography of Argentina, Chile and southern Brazil.

R. DeC. Ward, of Harvard University, will begin work on his book on the "Climatology of the United States" as soon as the college term closes in June. Later he will take part in the Transcontinental Excursion.

PRESIDENT OF THE GEOGRAPHICAL SOCIETY OF LIMA. Engineer José Balta has been elected President of the Geographical Society of Lima for 1912.

GENERAL

DROUGHT AND BUILDINGS. The drought of the summer of 1911, in England, caused widespread and expensive damage to buildings, as reported in *The Builder* for January 5, 1912. In cases where foundations rested on clay, the drying of the clay necessitated underpinning in hundreds of cases in and about London. Whereas, in ordinary summers, the clay is quite moist at a depth of 2.5 to 3 feet below the surface, during the past summer it was often perfectly dry at depths of 5 and 6 feet. The dry clay became powdery and when the autumn rains began, the water found its way into the fissures and washed out the clay. Thus sliding or lateral movements took place. The study of such weather effects upon the clay soils emphasizes the importance of having a depth of foundation which reaches below the level affected by snow and rain, and of carrying all the foundations to a uniform depth. In more than seventy cases of the settling of buildings studied by the author of the article in *The Builder,* there were only two or three cases in which fractures occurred where the foundations were at a uniform depth. R. DEC. WARD.

PHOTOGRAPHING RED SNOW IN NATURAL COLORS. A meteorological photograph of very unusual interest was taken by Mr. Ford A. Carpenter, Local Forecaster of the U. S. Weather Bureau at San Diego, Cal., in July, 1911, during a camping trip of the Sierra Club. The photograph, which is the only one of its kind, shows the phenomenon of "red snow" in natural colors. It was taken by the Lumière process. The red snow first attracted attention because the hoof prints of the pack animals, which were plunging through deep snow in the snowfields on the saddle of the Vogelsang Pass, were observed to be "splotched with red as if the snow-crust had cut the mules' feet and dyed the snow with drops of blood." The picture, which is admirably reproduced in the *Transactions of the San Diego Society of Natural History,* Vol. 1, No. 3, pp. 108-111, was taken on the summit of Lambert Dome. Mr. Carpenter's notes say: "It looks as if carmine ink had been spilled over the snow." R. DEC. WARD.

USEFUL OLD MAPS. Sir Herbert George Fordham recently read a paper, "John Cary, Engraver and Map-seller, 1769-1836," before the Cambridge Antiquarian Society, England, in which he said that Mr. Cary was engraving maps and plans earlier than 1783, his publications marking a decided advance in the art of cartography in England. Of his maps and atlases the three sets of the English and Welsh counties, which went through many additions, are the best known. The plates of these maps still exist and the county maps of the folio atlas give so good an outline of the roads, and are so clear and satisfactory in their details, that they are, even now, though more than a century old, being printed and published for the use of motorists.

DR. BAUER'S TRIP OF INSPECTION. The *Bulletin* mentioned (Feb., p. 119) the return to Washington of Dr. L. A. Bauer after a nine and a half months' trip of inspection of the magnetic work being conducted, under his direction, on board the *Carnegie* and by land expeditions in Australia and Asia. *En route* he visited the magnetic observatories at Apia, Christchurch, Melbourne, Mauritius, Kodaikanal, Bombay and Alibag, Dehra Dun, Barrackpore, Toungoo, Batavia and Buitenzorg, Hongkong, Manila and Antipolo, Zi-ka-wei, Tsingtau, Tokio, Honolulu and Tucson, Arizona. He also conferred with various government officials and scientific organizations and made arrangements regarding co-operative magnetic survey work. He observed the total solar eclipse of April 28, 1911, at Tau Island of the Manu group, having been favored with clear weather.

OBITUARY

A. Lawrence Rotch. Professor Rotch died in Boston on April 7 at the age of fifty-one years, leaving a wife and three children. His father's family were among the founders of New Bedford and his mother was a daughter of Abbott Lawrence, formerly Minister to England. Young Rotch spent much of his youth in Europe, and, on returning to America, he entered the Chauncey Hall School, where he was prepared for the Massachusetts Institute of Technology, in which he took the course of mechanical engineering and graduated in 1884.

That year he begin to build the Blue Hill Meteorological Observatory, with which his name has been associated, and in which the first observations were made on Feb. 1, 1885. Its annual observations have been published in the *Annals* of the Observatory of Harvard College. He set a pattern to meteorologists and adopted the international system of records before they came into use at Washington. At Blue Hill he first introduced the use of kites in exploring the upper air and became especially noted for his studies by means of kites and balloons. He obtained the first observations high above the Atlantic with kites in 1901 and the first observations, five to ten miles above the American Continent, with registration balloons in 1904. In 1905 and 1906, he collaborated with Teisserenc de Bort in sending a steam yacht to explore the tropical atmosphere. The efforts he made to advance knowledge of the upper air were recognized by honors awarded to him by learned societies and governments. Harvard gave him the A.M. degree and made him assistant in the Harvard Observatory. He also took part in scientific expeditions to South America, Europe and Africa. He was the author of "Sounding the Ocean of the Air" (1901), of "The Conquest of the Air" (1909), and of many articles in scientific journals.

Prof. Dr. Richard Andree. This ethnographer and geographer died on Feb. 22, in his 77th year, while on the way from Nuremberg to Munich. His father was the founder of *Globus* and the son became its editor in 1891 and placed it in the first rank of ethnographical periodicals. His writings in his favorite field and on geographical topics, were widely read; and he was closely associated with the production of the famous "Andree Handatlas" and other cartographic products published by Velhagen & Klasing in Leipzig.

Prof. Albert Scobel. This well-known cartographer is dead at the age of 61 years. He was the successor of Richard Andree as superintendent of Velhagen & Klasing's geographical establishment in Leipzig and in the editorship of the Andree Handatlas. The fifth edition of his very useful "Geographisches Handbuch" in two volumes appeared in 1910. He published a Commercial Atlas, many school atlases and was one of the best representatives of German cartography.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

The Arctic Prairies. A Canoe-Journey of 2,000 Miles in Search of the Caribou; being the Account of a Voyage to the Region North of Aylmer Lake. By Ernest Thompson Seton. xvi and 415 pp. Ills. and index. Charles Scribner's Sons, New York, 1911. $2. 9 x 6.

Seton's trip was on the Athabasca R., and the book is a detailed description of the plant, animal and human life along the river. The farthest north of the journey was Lake Aylmer in 64° N. Lat. The explorer planned to see the caribou migration, to prove the abundance of this animal, to explore and map Lake Aylmer, which Back had roughly sketched, and to reach the land of the musk-ox; in all these points he was successful. A large number of observations are recorded in pen sketches and text of the animal and plant life. Most of the book is a narrative of the journey, but in the appendixes are records of the natural vegetable growth of the country, a brief account of the soil and climate, results of the little cultivation attempted, a summary of observations of the buffalo and yak, lists of the insects and notes on plants, mammals and birds. The book is recommended as a source of information as well as of enjoyment.

R. M. BROWN.

The Leading Facts of New Mexican History. By Ralph Emerson Twitchell. Vol. I. xx and 506 pp. Maps,* ills., index. The Torch Press, Cedar Rapids, Iowa. 1911. $6. 10 x 6½.

To judge by its first volume this work deserves a prominent place among important contributions to our knowledge of the Southwest. Beginning with the earliest known period of man in New Mexico, the author brings out compactly the salient features of New Mexican archæology. Due recognition is given to the great rôle played by physiographic and geographic factors as determinants of the proto-historic civilizations which flourished long before the advent of the Conquistadores, and an important place is assigned to the hydrographic factor. The map on page 5 shows clearly how human life was able to thrive in the heart of valleys still in the stage of fluvial erosion. Other physical determinants have not been taken up with much detail, but the reader will be able to make more than one important deduction in this field, thanks to concise descriptions of the various modes of life.

The transition to Spanish times is marked by a marvelous feat in American exploration—the transcontinental trip undertaken by Alvar Nuñez Cabeza de Vaca and his companions, with which the second chapter begins. From Mr. Twitchell's map it appears that New Mexican territory was traversed from its modern eastern frontier to a point near the western state line and not far from the present international boundary. The author has evidently based his map on data derived from Cabeza de Vaca's *"Relacion."* The degree of accuracy attained in tracing the route accordingly depends on the correlation of Vaca's information with our present knowledge of New Mexican geography. Mr. Twitchell's critical care is amply evinced by the discussions accompanying the narrative.

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* Listed under "New Mexico," "United States-Mexico" on p. 316, and under "Historical" on p. 320.

The description of this epoch-making episode is the prelude to a detailed description of some momentous events during the sixteenth century. Of course, the book could not have been confined to events occurring merely within the present boundaries of New Mexico; and Mr. Twitchell does not fail to show how intimately the early history of New Mexico is interwoven with the thread of Spanish activities. After Mexico City became the Spanish Viceroy's capital, a number of exploration parties were sent out in rapid succession by the Spaniards. Beginning with Nuño de Guzman's expedition, the writer treats them chronologically and dwells particularly on the fate of the explorers in New Mexico. Copious footnotes throughout the text impart further clearness to the account. A whole chapter is devoted to Coronado's invasion of the North. Geographers and geologists alike will note with interest the reference made to the discovery of the Grand Canyon of the Colorado by Don Garcia Lopez de Cardenas.

Mr. Twitchell ably sets forth also the extraordinary activity of the Spanish friars. It was the cross that was often planted in token of Spanish suzerainty before any royal standards were unfurled. The harvest of souls was as potent an impelling factor among the various religious orders that supported many of these expeditions, as the lure of the precious metals was to the layman.

As to the origin of the State's name it is asserted that Ibarra, on returning from the expedition undertaken in 1563, boasted that he had discovered a new Mexico, and "it is not unlikely that from this circumstance the name came to be applied in later years." The author shows that the name was given at first to a region far more extensive than that now covered by it.

About this time the conquest of the northern territory was decided upon, and Don Juan de Cñate accomplished it near the close of the sixteenth century. Even then the power of the conquerors was somewhat shadowy, which is not surprising in view of the distance between New Mexico and the seat of government. The details of the Pueblo rebellion and independence are given sufficiently to reveal the real feeling among the Indians. The final success of the Reconquistadores put an end to native attempts to throw off the foreigner's yoke. The eighteenth century came in with the Spaniards firmly entrenched in authority. The one hundred and twenty-two years of their rule, during which peace stimulated trade, are reviewed. The author briefly alludes to New Mexican industries at the beginning of the nineteenth century. More space might well have been devoted to so important a phase of New Mexico's development. The volume closes with an account of the expedition of Major Zebulon M. Pike and the rejoicings when the news of Mexico's independence were received at Santa Fé. The bibliography at the end of each chapter and the illustrations are good. LEON DOMINIAN.

Highways of Progress. By James J. Hill. x and 354 pp. Index. Doubleday, Page & Co., New York. 1910. 8 x 5½.

This is a book on conservation by one who has done more than his share in the development of our great Northwest. It is divided into thirteen chapters and considers many different topics, devoting a large share of attention to agriculture, to old and new farm methods, commerce, industrial and railroad foundation, to Oriental trade, irrigation and drainage, waterways and the railroad. While it is written sometimes in a pessimistic tone, it is in reality an optimistic book. It is written from a large viewpoint and with a long look ahead. It shows that the author has read widely and is more than interested in the larger problems that face the country, of which his own special section is only a small part. The book is geographic in tone in that the author pays a good deal of attention to the relation between human conditions and the physical conditions which have influenced or controlled them. The book has been very clearly written, the style is pleasing, and while statistics are used freely they are used in such a way that the general reader is not embarrassed by them. The book deserves to be read by all who are interested in the promotion of the industries of their country or the conservation of its natural resources.

RICHARD E. DODGE.

SOUTH AMERICA

[Following the Conquistadores] Along the Andes and Down the Amazon. By H. J. Mozans. With an Introduction by Colonel Theodore Roosevelt. xx and 542 pp. Map,* ills., bibliogr., index. D. Appleton & Co., New York. 1911. 9 x 6½.

An earlier volume by this author is entitled "Following the Conquistadores Up the Orinoco and down the Magdalena." It is a little difficult to find two other volumes on South America so replete with historical allusions and so thoughtfully written. History is the main theme; the author's journeys and experiences are always subordinated to the story of the great Conquistadores. The opening chapters relate to Panama, La Paz, Cuzco, and southern Peru. The most important parts of the book are found in chapters 16 to 24, inclusive, where the author is in newer territory. His descriptions of travel conditions are subordinated to serious geographical and archæological considerations, and we are made to realize the difficulties of the Conquistadores, whose steps the author follows in his journey across South America. The three chapters of greatest interest are 19, 23, and 24; the two last, entitled "Romance of the Amazon" and "Sailing Under the Line," are among the most attractive ever written describing the great river of northern Brazil.

In a number of places explanations of physical phenomena are unfortunately weak; as for instance, the explanation of the arid west coast of Peru, where the Humboldt Current is made to collect moisture from the overlying air and thus in some way give rise to arid conditions on the land. The Humboldt Current is indeed related to the aridity of the west coast of South America but not in so simple a manner as this. The implication on page 116 that Peru has been thoroughly surveyed and the statement on page 498 that the fall of the Amazon for the last 2,000 miles of its course is but little more than an inch to the mile are illustrations of a tendency to incorrect generalization.

We have also to object to the statement on page 526 that the author has "proved that one may traverse even the wildest and least populated parts of South America with comparative ease and comfort." It will strike many with surprise to find this statement in a book so excellent in other respects. As a matter of fact, the author was almost continually in touch with human habitations, a fairly good native food supply, and at Iquitos was able to secure an ocean steamer for four-fifths of the journey across "one of the wildest" (?) parts of South America. If we use this term for the route from Truxillo to Iquitos and Pará, what resources of language are left to describe the travel conditions in the really difficult sections of the Amazon Valley, the Andes Mountains, etc., where food supplies are wanting and population either absent or hostile?

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* Listed under "Peru-Brazil, etc." on p. 317.

On the other hand, it is not desired to obscure in the slightest degree the really great value of the book to all students of South America. We have rarely seen so delightful a blend of geography and history as these pages exhibit. The book clearly illustrates how much more illuminating an historical presentation becomes (especially when it deals with wide spaces) if the author takes the trouble to visit the field and gather first-hand impressions of climate, relief, vegetation, etc., and thus reconstruct in their proper geographic environment the schemes of a past age. Judging the work from this standpoint, it is one of a very small class of books containing real contributions to the interpretation of historical events determined in part by geographic conditions. On the whole, it has been remarkably well done, and like Dr. Mozans' earlier book on the Orinoco, it forms one of the most substantial contributions to Latin-American literature of the past quarter-century. ISAIAH BOWMAN.

A Search for the Apex of America. High Mountain Climbing in Peru and Bolivia, including the Conquest of Huascarán. With Some Observations on the Country and People Below. By Annie S. Peck. xviii and 370 pp. Map.* ills. Dodd, Mead & Co., New York. 1911. $3.50. 9 x 6.

The expanded title covers the story of this book. When so definite a task as the ascent of a mountain is the all-absorbing goal of one's ambition, it is unfortunate that the public must read, in order to get a first-hand account of the undertakings, so much of journeys, visits and conditions of life which form the incidental features. Fifteen out of the twenty-seven chapters of Miss Peck's book are of this character. Chapters V and VI, which give an account of the attempt to ascend Mount Illampu (Sorata), Chapter VIII, Arequipa and El Miste, Chapter XIII, another trial of Illampu, Chapters XV, XVI, XIX, XX, XXV, and XXVI with the various records of Huascarán, and Chapter XXIII, the account of the ascent of a smaller peak, comprise the entire account of the mountain work of the author in South America. The various expeditions were made under the most trying circumstances, and great persistence was shown by Miss Peck in pushing her expeditions through to so complete a climax. In the first place, at no time did she have enough money for the work, and one can sympathize with her as, when speaking of the expedition sent from Paris to Peru to secure the altitude of Huascarán, she writes that "$13,000 seems a large sum to spend for the triangulation of a single mountain which it cost but $3,000 to climb. With $1,000 more for my expedition, I should have been able with an assistant to triangulate the peak myself." Then the native porters always failed her at the crucial moments, but as this is usual such a failure can be guarded against provided the money is at hand. Again, the companions insisted on dictating the course of the party while on the mountains and Miss Peck was not able really to command any of her expeditions. The book is illustrated by many pictures, covering all phases of her itinerary.

R. M. BROWN.

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* Listed under "Peru-Bolivia, etc." on p. 317.

Los Aborígenes de la República Argentina. Manual adaptado á los programas de las Escuelas Primarias, Colegios Nacionales y Escuelas Normales. Por Félix F. Outes y Carlos Bruch. 149 pp. Maps,* ills., index. Ángel Estrada y Cía, Editores, Buenos Aires. 1910. 8 x 5½.

This small volume, prepared for use in the higher schools and colleges of Argentina, gives a fairly comprehensive survey of the evolution of life in the republic. One third of the book is devoted to general notes on the larger geologic and palæontologic features of the country. These notes lead up to a short discussion of prehistoric man in Argentina. The occurrences of fossil human skulls, in the Pampean, and abundant palæolithic implements, in many localities, are the evidences of man's antiquity in that part of the world.

The remainder of the book covers the groups of aborigines in historic times. Six groups are recognized: (1) in the mountains of the northwest; (2) in the forests of the Gran Chaco; (3) in the littoral of the great rivers (the Argentine mesopotamia); (4) in the pampas proper; (5) in Patagonia; and (6) in the archipelago south of the Straits of Magellan.

A systematic discussion of each group is given according to a rather rigid plan, as follows: the areal distribution of the group; physiography of their habitat; physical characteristics of the people; language and symbology; food, habitations, dress, and occupations; sports and festivals; religious beliefs, marriage and funeral rites; social organization; relations to other tribes; barter and transportation. A map showing distribution, many illustrations of implements, customs, etc., and a bibliography supplement the text for each group.

The treatment of so many topics in such small space makes each topic necessarily very brief—not infrequently only a line or two. Yet in spite of this brevity a good many striking contrasts are found when the life of one group is compared with another. Many of these contrasts can be traced readily to differences in the physical aspects of the region. WALTER S. TOWER.

AFRICA

The Suk: Their Language and Folklore. By Mervyn W. H. Beech. With an Introduction by Sir Charles Eliot. xxiv and 151 pp. Maps,† ills. and appendix. Clarendon Press, Oxford, 1911. 9 x 6.

The linguistic and ethnographic material presented entertainingly in this brief volume should go far toward the solution of several problems of inner Africa. Mr. Beech has not only identified the Suk with the better-known stock of the Masai through their Nandi connections, but the careful detail which he offers may be expected to broaden our knowledge of the Masai themselves. In one rather important particular this study is unique in ethnography. We have no small number of instances in which human societies are known to have changed their environment and consequently their habit of life, but we lack the record of the period in which the change is operative. Mr. Beech makes it clear that the Suk are found in this rare stage of flux. In origin they are fugitives, sad remnants of war who have found a lonely refuge in the readily defensible gully lands of the Elgeyo escarpment. In this condition of safety and seclusion the Suk have progressed to an agricultural development. With accretion of numbers as an internal result of the fastness security and also in continuance of the external refugee system the Suk have become sufficiently strong to advance upon the plains. Here they have become a pastoral people, nomadic within safe limits which yet are sufficiently extended to cancel whatever idea of house and home has been reached in their agricultural stage. This change of habitat affords opportunity for a study of cultural modification as interesting as it is rare under actual observation. The student of speech in Africa will welcome the minute grammatical record presented in this volume, and the copious vocabulary will fit into its place in the examination of the Masai-Nandi group. WILLIAM CHURCHILL.

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* Listed under "Argentina," on p. 317.

† Listed under "British East Africa" in *Bull.* Vol. 44, No. 1, Jan., 1912, p. 78.

Ethnology of A-Kamba and Other East African Tribes. By C. W. Hobley. xvi and 172 pp. 54 ills., map, appendix and index. University Press, Cambridge, 1910. $2.50. 8½ x 5½.

The A-Kamba tribe inhabits the country between the mountains of Kenia and Kilimanjaro in British East Africa. The characteristics of these people form the theme of most of this book. Brief notes on other tribes, as the Masai, the A-Kikuyu, the Mogogodo and the Mweru, conclude the volume.

The description of the A-Kamba and their customs is most carefully and interestingly written. From the standpoint of the anthropologist the author says that the points of greatest interest are the circumcision ceremonies and in connection with them the carvings of pictographic riddles on the Musai sticks. A chapter describes the baskets, metal work, pottery, house building, native beer, musical instruments, bee-keeping and stool manufacturing. This chapter and many others are rich in sketches. Among the notes on other tribes is a chapter on the "Early Colonization of British East African Highlands," which discusses the distribution of the aborigines and the invasions and accidents which finally scattered them. R. M. BROWN.

The Climate of the Continent of Africa. By Alexander Knox. xii and 552 pp. Maps,* index. University Press, Cambridge. 1911. $7. 9½ x 6½.

Information regarding African climates has been accumulating so rapidly in recent years, and is scattered through so wide a range of publications, that it is a satisfaction to have Mr. Knox's summary. The author has read extensively all available reports, official and unofficial, and acknowledges the sources of his information with complete and refreshing frankness. In the words of the Preface, the volume "represents an endeavor to place before those who require it such accurate information concerning the climate of Africa as is available." We cannot, however, in any way reconcile ourselves to the fact that Mr. Knox has nowhere mentioned Hann, or Hann's admirable and unusually thorough discussion of the climates of Africa in the third edition of the famous "Handbuch der Klimatologie."

The rainfall maps,* one for each month and one for the year, are, with the exception of those for extreme southern Africa, new compilations and are therefore the most important part of the book. Ten-year rainfall records are taken as the basis of the maps, the shorter period stations receiving less weight in drawing the isohyetal lines. There has been such a rapid increase in the number of rainfall stations in Africa of late years that Mr. Knox has done a welcome piece of work in bringing the newer records together. These rainfall maps are first discussed, after which the general climatic conditions of the whole continent are considered month by month, thus giving a broad view which many who cannot take time to read the whole book will find useful.

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* Listed under "Africa" on p. 317.

The various countries, colonies and protectorates are then treated in detail, grouped into four divisions. Productions are briefly described. Liberal quotations from personal accounts of climate and weather give these descriptions local color, and make them vivid. Frequent reference is made to the suitability of the climates for European residence, and while these statements are naturally rather indefinite, there is often an emphatic statement, as, *e. g.*, on page 179, "On the Ivory Coast no European should prolong his first stay over 18 months, and subsequent periods of residence should be limited to 15 months, with breaks of 5 or 6 months for return to Europe." Clothing and food also receive attention. For each section, or group of sections, selected climatic data are given in tabular form.

We regret that the rainfall maps are, with the exception of the mean annual, placed in a pocket instead of being bound in with the text. R. DeC. Ward.

ASIA

The Full Recognition of Japan. Being a Detailed Account of the Economic Progress of the Japanese Empire to 1911. By Robert P. Porter. xii and 789 pp. 7 maps* and index. Henry Frowde, Oxford University Press, New York, 1911. $4. 9 x 6½.

Conclusions are a matter of interpretation; each interpreter has full right to draw his own, but Mr. Porter has the skill to mass facts into a convincing body of proof. Furthermore, he presents impartially the facts which he has amassed for his proof. In this regard the work will long stand as a magazine of the material necessary for the comprehension of the civic movement in Japan which must attract wide interest. The work is excellently balanced in all its parts, each a satisfactory essay on some salient feature of the economic or artistic life of the Island Empire, a division which fortunately is less strongly marked in that life than in ours; each of the chapters fits into its proper place in the presentation of so much of the old as is needful for the comprehension of the new and of so much of the sense underlying the new as is needful for intelligent comprehension of Oriental progress on lines derived from the Occident. How far this new progress is but imitative, how far it represents the adjustment of that which has been found of value in one civilization to the diverse needs of another civilization, that is a question which Mr. Porter can answer no more satisfactorily than others who have preceded him. Pierre Loti has recorded one Japan, Lafcadio Hearn has recorded another; no critic may reconcile the rival claims and determine which, or neither, is the true Japan.

It tends toward accuracy to present tables of figures and to set consonant tables together for comparison. So far as these facts are really facts they are here set down for reference; no work contains so many and of course no work contains them brought so closely to the current dates. It is upon this statistical side that the author has spent most of his effort. Art, music, literature are scarcely to be presented in tabular form. These chapters, accordingly, free from massed figures and treated with much freer hand, are more distinctly the record of personal impression; therefore they run more smoothly and produce a better effect. The whole theme of the work is the chronicling of change in Japan and the comprehension of its method and incidents. Mr. Porter has been able to witness change within the period of his own acquaintance with Japan; therefore he has, in his own experience, a comprehension of alterations which have come to pass with himself as witness, and this gives him in large measure the mental attitude for the reading of the record of more extended change.

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* Listed under "Japanese Empire" on p. 318 and under "World and Larger Parts" on p. 320.

William Churchill.

Life in the Moslem East. By Pierre Ponafidine. Translated from the Russian by Emma Cochrane Ponafidine. xiii and 429 pp. Ills. Dodd, Mead & Co., New York, 1911. 9½ x 6½.

Consul-General Ponafidine's work is not a political memoir, indeed he is sedulous to avoid the slightest revelation of the policy which he so successfully administered. Just by reason of this reserve, of this very careful hiding, the work is all the more valuable as a contribution toward our knowledge of what Russia is doing in that vast area of central Asia whence in the past have swept over and over again waves of crude barbaric might upsetting high civilizations. The barbarian of the central desert is still at the Chinese Wall, still does he hover at India's scientific frontier. But in these later days at the back of the barbarian stands Russia. From the Gate of the Caucasus to the Gate of the East, the Russian is popular and the Briton is unpopular. After conquest each is busy in the task of administration; the British tax is scientifically adjusted and it galls, the Russian impost is everything that is uneconomical and it is paid with a smile. The author does not reveal why this is so, but there are unstudied revelations, and these are all the more valuable. The keynote of the greater Russian policy is sympathy. It may be at times an amused tolerance, but it is always sympathetic.

Other works are readily accessible which cover the field of this work. We have more minute studies of Persia; in greater detail we may readily find the story of the sacred pilgrimage to Mecca; there is store of critical study of India. But not in one nor in all is there to be found the elucidation which this volume sheds upon Russia in Asia. It is a very human problem and calls for human sympathy. Russia in Asia is but the sum and congeries of the Russian in Asia. The author's record of the life and the alien culture with which he has had to deal is intimate and appreciative. He sets forth a record of the turmoil and the calm of the East which is charged with sympathy whether he is dealing with the crudity of those days at Mecca about the Kaaba or the gentle violence of the worshippers of Bowani, the latter so little comprehended by the British that in our speech their name of Thug has become typical of the rude violence which was essentially not their method. Read with this understanding in the reader's mind, the work should prove a contribution of rare value to our knowledge of the great drama which is working out in mid-Asia. William Churchill.

Meine Vorderasienexpedition 1906 und 1907. Band I, Erster Teil. Die fachwissenschaftlichen Ergebnisse. Von Hugo Grothe. Mit Beiträgen von Prof. Dr. Broili, Dr. J. Oehler, Dr. T. Menzel, Hofrat Prof. Dr. J. Strzygowski, und Prof. Dr. L. Curtius. xvi+cclxxxxv pp. 162 ills., 2 plans and 1 map.* Verlag von Karl W. Hiersemann, Leipzig, 1911. M. 28. 10 x 7½.

Four years have elapsed since the completion of the author's exploration of the Antitaurus in particular and of Cappadocia in general, and now we begin to have the results. Grothe was busy in the field for a year and a half, finishing on the last day of 1907. In this volume we find nine essays dealing with specific detail of the geography of the expedition or with specific collections made in connection therewith. Four of these essays are by Dr. Grothe. The other five are by Broili of Munich on the geological and paleontological results, by Oehler of Vienna on the Greek and Roman epigraphy of Cappadocia, by Menzel of Odessa—by far the largest essay in the volume—on the Jezidae or devil worshipers, including translations and critical commentary of the Turkish text of Mustafa Nuri Pasha, by Strzygowski of Vienna on the art remains at Comana, Masylyk and Kaissari, and by Curtius of Erlangen on the minor artifacts gathered from the ruins under examination. These will appeal each in its own field to the several specialists.

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* Listed under "Turkey in Asia" on p. 318.

We find a wider appeal in the geographical results which are included in the essays by Dr. Grothe. He is not yet ready to present the narrative of his long and sedulous exploration in this interesting field which has long been neglected. Where these essays will adjust themselves to the work in its entirety must be determined in the future. For the present he gives us brief reports on the ruins of Masylyk which seems abundantly identified with the Augusta of Ptolemy, on the topography and historical geography of Comana Cappadociae, and notes of peculiar value upon the Hittite memorials which he found in his travels and several of which he brought to light. The illustrations are excellent, the epigraphic material thus presented will be found of great value in the study of this type of palæography.

His map of the Antitaurus whets our appetite for the more generally geographical reports of the expedition. In this he has covered the area between 36°–37° E. Long. and 38°–38°45′ N. Lat. In this area the red lines of his route show how deeply he has penetrated into mountain valleys, how keen he has been to break away from trodden paths and investigate the wilder regions. The result is shown in a brilliant series of observed contours which will go far to set forth the intricacy of these mountains which have preserved no less than four culture societies far into the periods of their successors.

William Churchill.

Burma: A Handbook of Practical Information. By Sir J. George Scott. x and 520 pp. Map,* ills. and index. Alexander Moring, Ltd., London, 1911. 10s 6d. 7½ x 5.

Though announced as a new and revised edition, it is more correct to describe this as a reprinting of a volume whose value has brought recognition as the standard authority upon that great region which used to be known as Farther India. The revision is comprehended in a page of errata to be corrected and in the rewriting of the appendix chapter on the Shan States to conform with the richer knowledge which has become available in the five years since the Handbook was first given to the press. It might prove difficult to assign too high a degree of praise to this work, a model of all that a compendium of the life and history of a people should be. It carries, and presents in an orderly arrangement, all the information for which the investigator would naturally consult its pages. It passes far beyond these limits, it is instinct with that sympathetic appreciation of the traits of the people of his charge which has set Sir James George Scott in the list of the great British proconsuls and which we have learned to esteem when he writes of the Burman under the thin veil of his pen name Shway Yoe. Those who have found it impossible to acquire the first edition of the Handbook will count it no hardship to take pen to make the corrections indicated on the errata table and thus to make the revision revised indeed.

William Churchill.

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* Listed under "British India," *Bull.*, Vol. 44, No. 1, Jan., 1912, p. 79.

Nord-Sumatra. Bericht über eine im Auftrage der Humboldt-Stiftung der Königlich Preussischen Akademie der Wissenschaften zu Berlin in den Jahren 1904–1906 ausgeführte Forschungsreise. Von Prof. Dr. Wilhelm Volz. Band II: Die Gajoländer. xix and 428 pp. Ills., maps,* index. Dietrich Reimer (E. Vohsen), Berlin. 1912. 18 M. 10 x 7.

Just a year ago we reviewed the first volume of this truly brilliant work of geographical and geological exploration.† This second volume most fitly completes the work, a tribute worthy of that great Humboldt in whose honor it is added to the store of our knowledge. Following the excellent method outlined in the former volume Prof. Volz has here entered upon ground still less known. The Gajo, or Gaju—for we lack present authority for a standard in the multiplicity of forest dialects—are the mountain folk of the extreme north of Sumatra, hemmed in along the coast line by a belt of those Atjeh with whom the government of Netherlands-India has waged uneven but unsuccessful war for generations. Organized military forces rarely come out of the bush fighting with flying colors, and the war with the Atjeh has taught the Netherlands full sympathy with Braddock's red column in the mountains of Pennsylvania. Because of this war Prof. Volz needed a column of soldiers, fortunately only as a precautionary measure and to secure him unimpeded access to the mountain lands, for once well within the terrain which he had set before his efforts the peaceful pursuit of his exploration was not interrupted.

The cartographic results of this survey cover a large part of an area almost amounting to four square degrees, the least known part of the great island. Within this area the names of mountains and streams, of settlements and provinces have been carefully ascertained and accurately recorded. The topographical map* indicates relief by contours and 'layer' coloring; the geological map* distinguishes six formational and six petrographic divisions. These maps show the geographical coördinates, the omission of which, in the maps of the former volume, was a matter for comment.

We now have the completion of a work which is typical of the combination of brilliancy in discussion with painful accuracy in gathering the material for such discussion, which represents the attainment of the trained German geographer. The region which in these two volumes has intimately been made known to us is not too extended for study by a solitary explorer, yet in none of the themes which must engage his attention is it so lacking in distinction as to lead to monotony. Professor Volz would be the first to deprecate the suggestion that his work is exhaustive and definitive. Not for long years of extending settlement will it be possible to speak the last word of discovery in such a land as the wilds of northern Sumatra. But he has produced a work which must serve as the foundation for all the study of this most interesting region which the future will afford. WILLIAM CHURCHILL.

The Emir of Bokhara and his Country. Journeys and Studies in Bokhara (with a chapter on my voyage on the Amu Darya to Khiva). By Ole Olufsen. ix and 599 pp. Map,‡ ills., bibliography, index. William Heinemann, London. 1911. 10 x 7½.

The book contains an exhaustive and well-balanced account of Bokhara based on observations during two journeys. The country is described under three headings, Mountain Bokhara, Steppe Bokhara and Desert Bokhara. The style is in part descriptive and in part narrative. The chapters on the desert and the mountain areas give in some detail a description of the country which, because of the omission of a generalized view at the outset into which the details may be fitted, is difficult reading, and one is glad when the author begins again to narrate the events of one of his excursions, which at least yields an inductive study even though the items are numerous. In addition to the chapters mentioned, there are valuable accounts of the climate, the vegetation and animals, the inhabitants, diseases and all the facts in the life of the community with which the anthropologist deals. The chapter on climate, taken in connection with that on disease, is especially interesting. R. M. BROWN.

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* Listed under "Sumatra" on p. 318. † *Bull.*, Vol. 43, 1911, pp. 377–378.

‡ Listed under "Bokhara" in *Bull*, Vol. 44, No. 2, Feb. 1912, p. 157.

EUROPE

Die Slaven. Ein Urvolk Europas. Von Martin Zunkovič. Sechste Ausgabe. viii and 373 pp. Map,* ills. and index. In Kommission bei der k. k. Universitäts-Buchhandlung Georg Szelinski, Vienna, 1911. 9½ x 6½.

We may not properly engage here upon the discussion of the philological problems set before us in this volume nor upon the particulars of Indo-European origin which are considered by the author from his particular point of view, one which, we must note, is intensely national. We observe that, in the course of repeated publication, this work has come to a new title, to a more positive statement. For its first four editions it was entitled "Wann wurde Mitteleuropa von den Slaven besiedelt?"; in this and the preceding fifth edition Mr. Zunkovič states the positive conclusion that the Slavs beyond all doubt are the original inhabitants of Europe and that no migration brought them thither. This is a highly particular field of inquiry, one with which geography can concern itself only when the special students have fought out their own battles and have agreed upon some results which will be generally acceptable.

The most interesting detail of this work is the employment which the author makes of geography to establish his contentions, remembering always that he is engaged in a field of the hottest controversy. He premises there can be no history of ancient Europe, the Europe of the aurochs and the period of the ice recession, there can be no light in antiquity so long as men are willing to "blot out the light with paper dogmas, with empty citations and phrases." The light of antiquity lies for him in the ancient names of the landscape; every brook and every hill, alp and lower meadow, farmstead and pasture land, so long as they are known by any name at all, reveal to his research this mysterious past. From Nijni-Novgorod to Normandy he reads the place names of Europe into Slavic roots and thus establishes the antiquity of his race. Geography has had contests of its own; it is restful to see geographical material cast into the polemics of a sister science and to sit back in the position of non-combatants awaiting the issue. WILLIAM CHURCHILL.

PHYSICAL GEOGRAPHY

Weather Science. An Elementary Introduction to Meteorology. By F. W. Henkel. 336 pp. Ills., index. T. Fisher Unwin, London. 1911. 6s. 8 x 5½.

We suppose that many persons may gain a real interest in meteorology through a perusal of "Weather Science," for there is much in the book which would appeal to an average and casual reader. But beyond that general statement of the place which this volume may, perhaps, fill we hardly care to go. Mr. Henkel writes like a lover of the science who, in an amateurish sort of way, has read a few meteorological text-books and journals, and has put down, without much attempt at order or system, some rather rambling comments on meteorological subjects. The arrangement of the chapters is singularly illogical. There is very frequent repetition throughout the book, and in some cases the repetition brings contradiction, or at least disagreement, between the earlier and later statements. The book is full of inaccuracies and errors, and is often far behind the times. Howard's cloud nomenclature is given, but there is not a word about the standard International Classification. Mixture is evidently regarded by the author as an effective cause of condensation, and he also still clings to that unfortunate idea that the cooling "by contact with the hill tops" is the principal cause of heavy rainfall in mountainous regions. We confess that we do not know what is meant (p. 101) by "the descent of the return trades brings abundance of rain," nor (p. 106) by "tropical cyclones causing storms." Some of the residents in Utah would probably resent the statement that the Salt Lake district is the driest region in the United States. And that "every cloud is the visible top of a column of invisible water vapor," while it has some grain of truth hidden away in it, is a statement which ought to be combated by many school children. We cannot help wondering who (p. 120) "Professor Reye of America" may have been. There is a singular fatality about the letter *s* in the spelling of Buy Ballot (p. 150), Glaishers (p. 155) and Alacka (p. 192). We are not in the habit of using "barber" for blizzard in this country, nor of thinking that ocean currents are due primarily to differences of specific gravity (p. 196).

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* Listed under "Hungary" on p. 319.

There are a few illustrations, mostly of instruments, and only two charts, of small size. We are glad, however, to call attention to the excellent cloud picture which forms the frontispiece—a most artistic view—and to the photograph reproduced opposite p. 140, showing the funnel and masts of a steamer whose hull is hidden in the fog (not a "ground fog" as the legend underneath asserts). Both of these pictures were taken by Captain Wilson Barker.

R. DeC. Ward.

OTHER BOOKS RECEIVED

NORTH AMERICA

These notes do not preclude more extended reference later

Immigrant Races in North America. By Peter Roberts. 109 pp. Maps, ills. Young Men's Christian Ass'n. Press, New York. 1910. 50 cents. 8 x 5½.

Good Roads Party. From States of Arkansas, Oklahoma, Lousiana, Texas. On Tour of Inspection through Eastern States. 148 pp. Ills., index. 1909. [Contrasts road-building here and abroad; describes road-building in New Jersey, New Hampshire, Massachusetts, Rhode Island, Connecticut and New York and gives a condensed history of road-making, road-legislation, etc.]

Guida degli Stati Uniti per l'immicrante Italiano. Pubblicata a cura della Societa delle Figlie della Rivoluzione Americana, Sezione di Connecticut. By John Foster Carr. 85 pp. Map, ills. Doubleday, Page & Co., New York., 1910. 15 cents. 7½ x 5. [A useful guide for Italian peasants arriving in this country; with many suggestions as to their procedure from the time of their arrival, societies and schools designed to help them, distribution of their countrymen in various states, etc.]

A Guidebook to Colorado. By Eugene Parsons. xxxii and 390 pp. Maps, ills., index. Little, Brown & Co., Boston. 1911. 7½ x 5. [Describes the State by counties. This plan may be useful to those who are visiting or investigating special localities, but it does not admit of an orderly treatment of aspects which appeal most to the tourist. Nothing is omitted, however, that may interest either the traveller or the intending settler.]

Place-Names in Quebec. By James White. Part II: Ninth Report of the Geographic Board of Canada, 1910. Sessional Paper No. 21a, pp. 153-455. Maps. [Gives the origin of many place names, lists of expeditions and explorers in Northern Canada (1576-1910) and bibliography of principal works consulted in preparing the volume.]

Exploration of Certain Iron-Ore and Coal Deposits in the State of Oaxaca, Mexico. By J. L. W. Birkinbine. Maps, ills. Transactions of the American Institute of Mining Engineers, pp. 671-693. [A paper read before the American Institute of Mining Engineers, at the Pittsburg Meeting, March, 1910.]

Cuba and Her People of To-Day. An account of the history and progress of the island previous to its independence; a description of its physical features; a study of its people; and, in particular, an examination of its present political conditions, its industries, natural resources, and prospects; together with information and suggestions designed to aid the prospective investor or settler. By Forbes Lindsay. xii and 329 pp. Map, ills., index, appendices. L. C. Page & Co., Boston, 1911. 8 x 5½.

Der Panamakanal. Die Bedeutung des Kanalbaues, seine Technik und Wirtschaft. Von Max D. Fiegel. vii and 183 pp. Map, ills. Dietrich Reimer (Ernst Vohsen). Berlin, 1911. M. 4. 9 x 6. [Treats of the plan of the canal, methods, labor and machinery used, the government of the Canal Zone, and the importance of the canal in relation to many countries and ports. One of the best books on the subject.]

SOUTH AMERICA

Die Entwickelung der Fabrikindustrie in lateinischen Amerika. Von Frhr. von Gemmingen. Angewandte Geographie, III. Serie, 10. Heft. 198 pp. Gebauer-Schwetschke Druckerei, Halle a. S. 1910. Mk. 4. 8½ x 6. [As comparatively little has been written on the present status of the industrial development of Latin American countries, this careful study is especially timely. The larger attention is naturally given to Argentina, where the greatest advance in manufacturing has been made.]

Monografía de la Industria de la Goma Elástica en Bolivia. Por Manuel V. Ballivián y Casto F. Pinilla. v and 354 and lxxxiv pp. Map. Dirección General de Estadistica y Estudios Geográficos, Bolivia. 1912.

Compendio de Corographia do Brasil de Accôrdo com o Programma do Gymnasio Nacional. Pelo Dr. Feliciano Pinheiro Bittencourt. Second edition, revised and augmented. 381 and viii pp. Maps, ills. Francisco Alves, Rio de Janeiro. 1910. 7 x 5. [A good, condensed treatment of the geography and activities of Brazil modeled on recent French school geographies.]

Flora der Umgebung der Stadt São Paulo in Brasilien. Von Dr. A. Usteri. 271 pp. Map, ills., index. Gustav Fischer, Jena, 1911. Mk. 7. 10 x 6½. [A thorough study of the flora in the neighborhood of the city of São Paulo with discussion of the plants peculiar to the dry lands and the swamps; also a list of the plants (155 pp.) with description in Latin of each variety.]

Les Français au Brésil et en Floride (1530-1568). Par Eugène Guénin. Premiers essais de colonisation. 100 pp. Eugène Bigot, Paris. 1910. Fr. 2.50. 7½ x 5.

AFRICA

In Africa (Lettere dall' Eritrea). Di Giotto Dainelli. Parte Prima: Lungo l'Anseba e sull'altipiano abissino. 184 pp. Maps, ills. Parte Seconda: Lungo le pendici dell'altipiano abissino e in Dancalia. 201 pp. Maps, ills. Serie Viaggi. Istituto Italiano d'Arti Grafiche-Editore, Bergamo. 1910. L6.50 each. 10½ x 7½ each. [Good geographical descriptions and superior maps and photo-engravings.]

Hausa Sayings and Folk-Lore with a vocabulary of New Words. Compiled and edited by Roland S. Fletcher. 173 pp. Oxford University Press, New York. 1912. 3s 6d. 7½ x 5.

Oriental Cairo. The City of the "Arabian Nights." By Douglas Sladen. xvi and 391 pp. Map, ills., index, appendices. J. B. Lippincott Co., Philadelphia, 1911. $5. 9 x 6½. [This book is to be commended to the public and especially to those who expect to visit Cairo.]

Nord-Togo und seine westliche Nachbarschaft. In Bildern und Skizzen für Missions und Kolonialfreunde. Von R. Fisch. 189 pp. Map, ills. Basler Missionsbuchhandlung, Basel. 1911. 40c. 7½ x 5. [Informing descriptions of North Togo based on missionary journeys in 1910.]

ASIA

Beiträge zur Geologie Ost-Asiens und Australiens. Mit Unterstützung des Niederländischen Ministeriums der Colonien. Herausgegeben von K. Martin. Sammlungen des Geol. Reichsmuseums in Leiden. 107 pp. Ills. E. J. Brill, Leiden. 1911. Mk. 9.50. 9½ x 6½.

Peoples and Problems of India. By Sir T. W. Holderness. Home University Library. 256 pp. Index, bibliogr. Henry Holt & Co., New York. 1912. 50 cents. 7 x 4½.

AUSTRALASIA AND OCEANIA

Australien und Neuseeland, Land. Leute und Wirtschaft. Von Dr. Robert Schachner. Aus Natur und Geisteswelt. viii and 120 pp. Maps, ills. B. G. Teubner, Leipzig, 1912. Mk. 1.25. 7½ x 5. [An admirable and comprehensive though condensed study of Australia and New Zealand.]

Official Year Book of the Commonwealth of Australia. Containing Authoritative Statistics for the Period 1901-1910 and Corrected Statistics for the Period 1788 to 1900. No. 4. 1911. By G. H. Knibbs. xxvii and 1230 pp. Maps, index. Commonwealth Bureau of Census and Statistics. Melbourne.

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New Zealand. By Sir Robert Stout and J. Logan Stout. 185 pp. Ills., index. University Press, Cambridge. 1911. G. P. Putnam's Sons, New York. 40 cents. 6½ x 5. [Tells briefly what New Zealand is and what has been done by her people.]

De Reis van Mr. Jacob Roggeveen ter Ontdekking van het Zuidland (1721-1722) verzameling van stukken, deze reis en de daaraan voorafgaande ontdekkingsplannen van Arend Roggeveen (1675-1676) betreffende, uitgegeven door F. E. Baron Mulert. xxvii and 331 pp. Maps, ills. Linschoten Vereeniging. 1911. Martinus Nijhoff, The Hague. 10 x 7.

EUROPE

Medieval Europe. By H. W. C. Davis. Home University Library. 256 pp. Map. Henry Holt & Co., New York. 1911. 7 x 5. [Among the best works in this handy volume series.]

Bau und Boden der Balearischen Inseln. Beiträge zur Landeskunde der Inselgruppe. Von Dr. Hans Praesent. Sonderabdruck aus dem 13. Jahresbericht der Geogr. Gesell. Greifswald, 1911-12, pp. 19-106. Map, ills. [A critical study of the map material and the geological and geographical literature covering the Balearic group, with detailed descriptions of the islands. Finely illustrated.]

Vergleichende Untersuchungen über die Vegetationsformationen des inneren Nordwestdeutschland, insbesondere die der Floren von Hannover, Göttingen und Ober-Harz. Inaugural-Dissertation. Von Paul Thormeyer. 123 pp. Göttingen, 1910.

Griechenland. Land, Leute und Denkmäler. Band 1: Athen und Attika. Von Adolf Struck. 204 pp. Map, plan, ills. A. Hartleben's Verlag, Vienna and Leipzig, 1911. Mk. 5. 10 x 7. [A well arranged description of Athens and Attica with 226 illustrations, mostly from photo-engravings, and good maps.]

POLAR

Spitsbergens Natur og Historie. Af Gunnar Holmsen. 111 pp. Maps. ills. Olaf Norlis Forlag, Kristiania. 1911. 9½ x 6½.

TEXT BOOKS

Commercial Geography, General and Regional. By J. F. Unstead and E. G. R. Taylor. viii and 238 pp. Maps, index. George Philip & Son, Ltd., London, 1911. 2s 6d. 7½ x 5. [Gives Physical Geography outlines as bases for the study of commercial geography.]

A History of Tennessee. From 1663 to 1911. For use in Schools. By G. R. McGee. 302 pp. ills., appendix, index. American Book Company, New York. 1911. 75 cents. 7½ x 5½.

Europe, a Supplementary Geography. By James F. Chamberlain and Arthur H. Chamberlain. (The Continents and Their People). ix and 258 pp. Ills. index. The Macmillan Co., New York. 1912. 55 cents. 7½ x 5.

L'Europe, La France. Par F. Schrader et L. Gallouédec. 2e Année. 440 pp. Maps, ills. Hachette et Cie, Paris. 1911. Fr. 3.50. 7½ x 5. [Designed especially for normal schools. The second half of the book is given to France. Written on the same plan as the "Cours de Géographie" published by Hachette & Co., one of the best series of geographical text books in Europe.]

Elementary Geography. A Text-Book for Children. By Charles F. King. vi and 222 pp. Maps, ills., index. Charles Scribner's, New York. 1909. 10½ x 8½.

The New Outlook Geography. Book 1: How People Live. Part I.—The British Isles. Part II.—Outside the British Isles. By W. C. Brown and P. H. Johnson. 252 pp. Ills. 1s 6d. Book 2: The Home of Man. Part I.—The British Isles. By W. C. Brown and P. H. Johnson. 343 pp. Maps, ills,. index. 2s 6d. George G. Harrap & Co., London. 1911. 7½ x 5 each.

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Primitive Animals. By Geoffrey Smith. x and 156 pp. Ills., index. University Press, Cambridge. 1911. 40 cents. 6½ x 5. [Gives a simple account of modern views on the relationships of the chief groups of the animal kingdom and their classifications.]

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NEW MAPS

Edited by the Assistant Editor

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

NORTH AMERICA

Alaska. (a) Map of Hugh Miller Inlet. [1:250,000]. [58°48′ N. and 136°33′ W.].
(b) Map of Head of Reid Inlet. [1:253,440]. [58°56′ N. and 136°52′ W.].
(c) Map of Northern Part of Muir Inlet. [1:57,000]. [58°50′ N. and 136°5′ W.].
Accompany, as Figs. XXIV, XXV and XXVI, "Revue de Glaciologie, No. 3" by C. Rabot, *Mém. de la Soc. fribourgeoise des Sci. Nat : Géol. et Géogr.*, Vol. 5, 1909.
[Reproduced from the report of the Harriman Alaska Expedition].

Mexico. Sketch Map of the Sonoran Desert Region by I. N. Dracopoli, F.R.G.S. 1:1,041,860. 32°27′ - 30°30′ N.; 114°35′ - 110°52′ W. 3 colors.

Newfoundland. (a) Map of Newfoundland from Rev. M. Harvey's Text Book of Newfoundland History (1890). [1:5,170,000]. 52°40′ - 46°0′ N.; 59°45′ - 52°30′ W.
(b) The Humber drainage. Reduced with some omissions from Howley's map of Newfoundland. [1:3,240,000], [50¼° - 48¼° N.; 59⅓° - 56° W.]. Oriented N.28° W.
Figs. 1 and 5, "Physiography of Newfoundland" by W. H. Twenhofel, *Amer. Journ. of Science*, Vol. 33, Jan. 1912, pp. 1–24.

United States-Mexico. (a) Suggested Line of Travel of Cabeza de Baca [Vaca]. [1:6,400,000]. 37° - 23° N.; 115° - 93° W. 1 color.
(b) Routes of Cabeza de Baca, 1536, Fr. Augustin Rodriguez, Francisco Chamuscado, 1581, Antonio de Espejo, 1582, Castaño de Sosa, 1590, Juan de Oñate, 1598. [1:7,000,000]. 34° - 25¾° N.; 107° - 100¾° W.
(c) Routes of the Coronado Expedition Specially Prepared under the Supervision of the Author [R. E. Twitchell]. [1:5,700,000]. 40° - 15° N.; 118° - 95° W. 1 color.
Accompany, facing p. 58, on p. 59, and facing p. 248, respectively, "The Leading Facts of New Mexican History," Vol. I, by R. E. Twitchell, Cedar Rapids, Ia., 1911.

United States

New Mexico. (a) Aboriginal Ruins near Sante Fé, N. M. [1:410,000]. [36°0′ - 35°30′ N.; 106°30′ - 105°50′ W.].
(b) Marches by Coronado and captains in New Mexico, 1540–1541. [1:3,640,000]. [37°20′ - 33°5′ N.; 109°10′ - 102°50′ W.].
(c) New Mexico in the Seventeenth Century. [1:3,640,000]. [36°25′ - 33°56′ N.; 107°35′ - 105°3′ W.].
Accompany on pp. 5, 167 and 188, respectively, "The Leading Facts of New Mexican History," Vol. I, by R. E. Twitchell, Cedar Rapids, Ia., 1911

New York. [Atlas of the counties of New York State, published by the Everts Publishing Co., Utica, N. Y. Title-page missing. With "Alphabetical Index to the Cities, Towns, Villages, Stations, etc., State of New York." Each plate separate and mounted on cloth. Price $34. Each plate is in four or five colors.]

[Plate] 8–9. Albany County [1:77,000]. 12–13. Allegany [1:100,000]. 16–17. Broome [1:94,000]. 20–21. Cattaraugus [1:117,000]. 24–25. Cayuga [1:104,000], with inset of northernmost township on same scale. 28–29. Chautauqua [1:112,000]. 32–33. Chemung [1:78,000]. 36–37. Chenango [1:103,000]. 40–41. Clinton [1:108,000]. 44–45. Columbia [1:86,000]. 48–49. Cortland [1:80,000]. 52–53. Delaware [1:133,000]. 56–57. Dutchess [1:100,000]. 60–61. Erie [1:110,000]. 64–65. Essex [1:158,000]. 68–69. Franklin [1:158,000]. 72–73. Fulton [1:86,000]. 76–77. Genesee [1:76,000]. 80–81. Greene [1:92,000]. 84–85. Hamilton [1:155,000]. 88–89. Herkimer [southern part] [1:96,000], with inset of northern part of Herkimer County [1:255,000]. 92–93. Jefferson [1:127,000]. 96-97. Lewis [1:125,000]. 100–101. Livingston [1:95,000]. 105–106 Madison [1:95,000]. 108–109. Monroe [1:87,000]. 112–113. Montgomery [1:85,000]. 116–117 Nassau [1:80,000]. 120–121. Greater New York City [1:102,000]. 124–125. Niagara [1:81,000]. 128–129. Oneida [1:127,000]. 132–133. Onondaga [1:96,000]. 137–138. Ontario [1:95,000]. 140–141. Orange [1:140,000]. 144–145. Orleans [1:78,000]. 148–149. Oswego [1:124,000]. 152–153. Otsego [1:124,000]. 156–157. (a) Putnam [1:87,000]; (b) Rockland [1:93,000]. 160–161. Rensselaer [1:86,000]. 164–165. Saratoga [1:101,000]. 168–169. (a) Schenectady [1:79,000]; (b) Schuyler [1:120,000]. 172–173. Schoharie [1:89,000]. 176–177. Seneca [1:80,000]. 180–181. Steuben [1:127,000]. 184–185. St. Lawrence [1:196,000]. 188–189. Suffolk [1:189,000]. 192–193. Sullivan [1:109,000]. 196–197. Tioga [1:80,000]. 200–201. Tompkins [1:80,000]. 204–205. Ulster [1:128,000]. 208–209. Warren [1:109,000]. 212–213. Washington [1:110,000], with inset of northern part of Washington County on same scale. 217–218. Wayne [1:88,000]. 220–221. Westchester [1:80,000]. 224–225. Wyoming [1:79,000]. 228–229. Yates [1:79,000].

[Maps of the usual type of county maps, compiled rather from the engineer's than from the geographer's point of view. Relief is not represented; occasional altitudes only are given Townships are distinguished by colors. There are separate symbols for: highways, improved highways, highways under contract for improvement, highways designated for future improvement and approved, steam railroads, electric railways, existing and proposed, school houses, elevations.

The linear element of the topography is of value for the regions of which no U. S. G. S. topographic sheets have been published. Otherwise the main value to the geographer of these and similar maps is the representation of property boundaries, of interest in tracing the history of settlement.]

SOUTH AMERICA

Argentina. [Six maps of Argentina showing the habitat of its aborigines. (1:40,000,000). (21° - 56° S. ; 76° - 50° W.) :] (1) Mapa de la República, en el cual aparece . . . la región que ocuparon las tribus Diaguitas. (2)—la región ocupada por las tribus chaquenses. (3)—por los pueblos que vivieron ó aun viven en el litoral y proximidades de los grandes rios. (4)—por los pueblos de las llanuras. (5)—por las tribus Patagones. (6)—por los pueblos que habitan la parte argentina de los archipiélagos magallánicos. Accompany, as Figs. 13, 42, 64, 83, 106 and 129, "Los Aborígenes de la República Argentina" by F. F. Outes and C. Bruch, Buenos Aires, 1910.

Bolivia-Brazil-Peru. Les Explorations de 1910 dans la Bolivie Sept'le et le Matto Grosso. Expéditions du Major P. H. Fawcett, du Colonel Candido Rondons, du Dr. Th. Herzog, etc. 1:6,000,000. 8°14′ - 19°50′ S. ; 70°45′ - 55°20′ W. 5 colors. Maps of America, No. 1, *l'Année Cartogr. 1910*, Oct. 1911.

[Incorporates the material of the authoritative map of South Peru and North Bolivia, 1:2,000,000, compiled at the suggestion of Sir Clements Markham by E. A. Reeves and published in the *Geogr. Journ.*, Vol. 36, Oct. 1910, (listed in the *Bull.* Vol. 42, 1910, p. 873).]

Colombia-Brazil, Etc (a) Le Rio Uaupes (Bassin Sept'al de l'Amazone) d'après le levé de Hamilton Rice appuyé sur des Observations astronomiques. 1:2,500,000. 2°29′ N. - 0°31′ S. ; 72°35′ - 66°48′ W. 2 colors.

(b) Du Rio Negro à Bogotá. Itinéraire de Hamilton Rice. 1:10,000,000. 5°30′ N. - 0°45′ S. ; 74¾° - 66° W. 3 colors.

Maps of America, Nos. 2 and [2a], *l'Année Cartogr. 1910*, Oct 1911.

Paraguay. Paraguay d'après la carte de Félix Ladouce dressée d'après les travaux personnels de l'auteur, sur les données astronomiques de F. de Azara, Toeppen, etc. 1910 1:2,500,000. 21⅘° - 27⅔° S. ; 59° - 54° W. 5 colors. Maps of America, No 3, *l'Année Cartogr. 1910*, Oct. 1911.

Peru-Bolivia, Etc. Map showing Huascarán and the Author's [Annie S. Peck's] Route. [1:7,000,000]. 8½° - 18° S. ; 80° - 67° W. 1 color. Accompanies, facing p. 1, "A Search for the Apex of America" by A. S. Peck, New York, 1911.

[The map, in total disregard of the form used consistently in the text for the name of the mountain which constitutes the main theme of the book, and in spite of the special pains taken in the text to inculcate proper pronunciation (*e. g.*: Caribbean, p. 8 ; Panama, p. 9), places the accent of Mt. Huascarán on the penultimate]

Peru-Brazil, Etc. Route Followed by the Author [H. J. Mozans]. [1:18,000,000]. [10° N. - 17° S. ; 82° - 63½° W.] With an inset forming eastern continuation of main map : Eastern Part of Amazon River. Same scale as main map. [1° N. - 5° S ; 66° - 48° W.]. Accompanies, facing p. 1, "Following the Conquistadores : Along the Andes and Down the Amazon" by H. J. Mozans, New York and London, 1911.

AFRICA

Africa. [Thirteen rainfall maps of Africa, 1:40,000,000 :] (1) Mean Annual. 9 colors. (2) January. (3) February. (4) March. (5) April. [The latter four maps in 6 colors]. (6) May. (7) June. (8) July. (9) August. (10) September. (11) October. (12) November. [The latter seven maps in 7 colors.] (13) December. 6 colors. Accompany, respectively as Pl. 1, facing p. 10, and as Pls. 2–13, in pocket, "The Climate of the Continent of Africa" by A. Knox, Cambridge, 1911.

[Valuable maps embodying new material except for the extreme south of the continent. Map (1) shows isohyets for 250, 500, 750, 1000, 1500, 2000, 3000 and 4000 millimeters. On the remaining maps the isohyets of 25, 50 100, 200, 300 and 400 millimeters are given. In this connection see also the map entitled "Jährliche Regenmengen auf dem Festlande von Afrika," 1:25,000,000, by G. Fraunberger, *Pet. Mitt.*, Vol. 52, 1906, Taf. 7, referred to by Mr. Knox in the discussion devoted to the above thirteen maps on pp. 1–13 of his book (cf. review, pp. 300–301).]

Anglo-Egyptian Sudan. Kordofan d'après les travaux anglais les plus récents. 1:6,000,000. 16° - 9° N. ; 26°47′ - 32°53′ E. 2 colors. Maps of Africa, No. 2, *l'Année Cartogr. 1910*, Oct. 1911.

Belgian Congo-Uganda-German East Africa. La frontière Germano-Belge dans l'Afrique Orientale. 1:3.000,000. 0° - 3°40′ S. ; 27°47′ - 30°28′ E. Maps of Africa, No. 5, *l'Année Cartogr. 1910*, Oct. 1911.

[Boundaries according to the agreements of June 14 and Aug. 11, 1910.]

Liberia, Etc. (a) Liberia. Explorations de M.M. W. Volz et C. Braithwaite-Wallis. 1:1,750,000. 8°37′ - 7°40′ N. ; 10°50′ - 9°5′ W. 4 colors.

(b) Liberia. Croquis montrant la frontière franco-libérienne. D'après les travaux de la Commission de Délimitation 1908–1909. 1:5,000,000. 8°55′ - 4°0′ N. ; 12°7′ - 7°0′ W. 4 colors.

Maps of Africa, Nos. [4a] and 4, *l'Année Cartogr. 1910*, Oct. 1911.

Nigeria-Kamerun. Zone frontière Anglo-Allemande (Nigeria-Cameroun) entre la Rivière Cross et Yola. D'après les travaux de la Commission de Délimitation (1907–1909). 1:3,000,000. 9¼° - 5½° N. ; 8°45′ - 12°27′ E. Oriented N. 16½° W. 2 colors. Maps of Africa, No. 3, *l'Année Cartogr. 1910*, Oct. 1911.

[Reduced from the map of the Nigeria-Cameroons Boundary Commission Survey, 1:1,000,000, published in the *Geogr. Journ.*, Vol. 36, Oct. 1910, and listed in the *Bull.*, Vol. 42, 1910, p. 874.]

Northern Nigeria. (a) [Three maps of Northern Nigeria, 1:8,000,000, limited by 14° - 6½° N. and 2° - 15° E., entitled:] (1) Primary Watersheds and River Systems. (2) Axes of Elevation. (3) Distribution of Salt, Tin stone, Gold and Galena.

(b) The Bauchi Plateau and the Nassarawa Tableland. 1:2,000,000. 10°30′ - 8°50′ N.; 7° - 10° E.

(c) Topographical and Geological Map of Northern Nigeria. 1:2,000,000. 14° - 7° N.; 3° - 14° E. 6 colors. With four geological sections.

Accompany, as Maps Nos. 1, 3, 4 and 2, and as separate map in pocket, respectively, "The Geology and Geography of Northern Nigeria" by J. D. Falconer, London, 1911.

[Map (c) a valuable fundamental map embodying the results of the Mineral Survey conducted by Dr. Falconer in 1904–09].

Rhodesia. North Eastern Rhodesia: Map Showing Native Tribes. [1:2,700,000. Scale incorrectly given as 31.6 miles=1 inch]. 8° - 16° S.; 27½° - 34½° E. 2 colors. Accompanies "The Great Northern Plateau of Rhodesia" by C. Gouldsbury and H. Sheane, London, 1911.

[Indicates the limits of the regions inhabited by the various tribes].

Sahara. A travers le Sahara Central (d'In Salah au Niger par l'Ahaggar). Itinéraire levé par N. Villatte. Janvier-Novembre 1909. 1:4,500,000. 27°20′ - 15°10′ N.; 0° - 7½° E. 4 colors. Maps of Africa, No. 1, *l'Année Cartogr 1910*, Oct. 1911.

Tunisia-Tripolitania. Croquis de la Frontière Tuniso-Tripolitaine. [1:3,500,000]. 33°24′ - 30°5′ N ; 8°52′ - 12°12′ E. Text map under 'Faits Politiques,' section devoted to Africa, *l'Année Cartogr. 1910*, Oct. 1911.

ASIA

Arabia. Arabie (Asie en dix feuilles: Feuille V). 1911. 1:5,000,000. 34° - 12° N.; 33° – 62° E. 8 colors. Pl. 50, Atlas Universel de Géographie par Vivien de Saint-Martin et Fr. Schrader. Hachette & Cie., Paris.

[The relatively large scale of the map well brings out our lack of knowledge of the interior of Arabia. Accompanying list of sources dated Oct. 1911. Cf. below under 'China.']

Arabia, etc. Arabie du Nord Est. Itinéraires du Capitaine G E. Leachman, 1910. 1:5,000,000. 33°50′ - 28°23′ N.; 42⅓° - 49° E. 4 colors. Maps of Asia, No. 5, *l'Année Cartogr. 1910*, Oct. 1911.

Asia. Asia: Geographical Divisions. [1:50,000,000]. 8 colors. Frontispiece, "Europe (Blackie's Causal Geographies Regionally Treated)" by H. J. Snape, London, 1911.

[Valuable map of the structural divisions of Asia, mainly according to Suess, previously published as Pl. XIX of J. W. Gregory's "Geography: Structural, Physical and Comparative," 1908.]

China. Chine (Asie en dix feuilles: Feuille VIII). 1911. 1:5,000,000. 41° - 20° N.; 100½ - 132 E. Plate 53, Atlas Universel de Géographie par Vivien de Saint-Martin et Fr. Schrader. Hachette & Cie., Paris.

[China on a larger scale than usually available in standard atlases. Accompanying lists of sources dated Dec. 1911. Cf. comment, *Bull.*, Vol. 43, 1911, p 552.]

Chinese Empire. (a) Turkestan Chinois et Kan-Sou. Itinéraires du Dr. M. Aurel Stein et de R. B. Lal Singh et R. S. Ram Singh, 1906-1908. 1:7,500,000. 43°45′ - 35°0′ N.; 74⅓° - 106° E. 5 colors.

(b) Partie Ouest du Turkestan Russe. Itenéraire de Mr. D. Carruthers, 1908. 1:5,000,000. 41½° - 40° N.; 72½° - 77½° E. 4 colors.

(c) Itinéraires de l'Expédition Kozloff en Mongolie et au Kan-Sou. 1:7,500,000. 48° - 34° N.; 99° - 108° E. 3 colors.

(d) Tibet Oriental et Chine Occidentale. 1:5,000,000. 32° - 24° N.; 98° - 104⅔ E. 4 colors.

Maps of Asia, Nos. 1–4, *l'Année Cartogr. 1910*, Oct. 1911.

[Map (a) shows routes of Bacot (1909-10), Fergusson (1906–07–10) and Weiss]

Federated Malay States. Selangor, Federated Malay States. 1910. 2 Miles to an Inch (1:126,720). 3°55′ - 3°21′ N.; 100°45′ - 102°4′ E. 6 colors. In four sheets. Published by the Central Survey Office, Kuala Lumpur, F. M S.

[Of the usual type of land survey maps; valuable because of its relatively large scale. Agricultural and mining "alienated" land, forest and other reserves shown. Relief indicated by approximate contours.]

Japanese Empire. (a) Chosen (Korea) and Southern Manchuria. 1:4,000,000. 44 1/5° - 33¾° N.; 120° - 132¼° E. 2 colors.

(b) Taiwan (Formosa). [1:2,100,000]. 25°18′ - 21°54′ N.; 119°27′ - 122°0′ E. 2 colors.

(c) [Two maps, viz.:] (1) The Japanese Empire. [1:12,300,000]. 53° - 20° N.; 117° - 157° E. 2 colors (2) Japan. 1:4,500,000. 46° - 31° N.; 128° - 146° E. 2 colors. With inset: Karafuto (Japanese Saghalien). [1:4,500,000]. 50⅓ - 45 5/6° N.; 141⅓° - 145⅓° E. 2 colors.

(d) [Two maps, viz.:] (1) Sketch Map of Japan: Administrative Divisions and Chief Railways. (2) Industrial Map of Japan. Both maps: 1:6,336,000. [42½° - 31° N.; 129° - 142° E.]. Oriented N. 42° E. 1 color.

Accompany: maps (a), (b) and (c) facing pp. 604, 654 and 778, respectively, and map (d) on rear inside cover, "The Full Recognition of Japan" by R. P. Porter, London, etc., 1911.

[Maps (a) and (b) show railroads, roads and lighthouses. Map (c1) shows chief railroads and steamship routes with approximate distances. Map (d2) gives value of output of each administrative division in thousands of pounds]

Sumatra. (a) Karte der Gajo- und Alasländer nach den Beobachtungen von Prof. Dr. Wilhelm Volz und dem vorhandenen Material. 1:400,000. 5°0′ - 3°16′ N.; 96°36′ - 98°10′ E. 8 colors.

(b) Geologische Karte der Gajo- und Alasländer nach den Beobachtungen von Prof. Dr. Wilhelm Volz und dem vorhandenen Material. Same scale and coordinates as map (a). 14 colors

Accompany, as Karten 1 and 2 in pocket, "Nord Sumatra. Band II: Die Gajoländer" by W. Volz, Berlin, 1912.

[Highly important maps of regions practically unexplored hitherto, embodying the result of Prof. Volz's systematic explorations in 1904 to 1906. Map (a) a relief map with approximate contours of 200 meters interval and six color "layers"; route in red. Map (b) distinguishes between six formational and six petrographic divisions. Cf. review of book on p. 304.]

Turkey in Asia. Karte des Antitaurus (auf Grund der Itineraraufnahmen vom 23. September 1906 bis 22. Januar 1907) von Hugo Grothe. 1:400,000. 38°43′ - 37°57′ N.; 35°49′ - 37°0′ E. 1 color. Accompanies "Meine Vorderasienexpedition 1906 und 1907: Band I, Erster Teil" by H. Grothe, Leipzig, 1911.

[Relief in approximate contours. Barometric altitudes given. Route in red.]

Turkey in Asia. (a) Modern Palestine with Ancient Towns and Highways. [1:1,370,000]. 33°50′ - [illegible] N.; 34°25′ - [illegible] E. 8 colors.

(b) Photo Relief Map of Palestine by George Armstrong (of the Survey Party) . . . Published by the Palestine Exploration Fund, . . . London, 1905. [1:1,[illegible]]. [34° - 30°[illegible] N.; 33°50′ - 36°30′ E.].

Accompany, as frontispiece and facing p. 13, "Biblical Geography and History" by C. F. Kent, New York, 1911.

[Map (a) a physical map of Palestine. Although very fair for a wax-engraved map a comparison with the map of Palestine, listed below, accompanying Hölscher's book, brings out well the limitations of this method of reproduction.]

Turkey in Asia. Palästina. 1:1,250,000. 33°53′ - 30°49′ N.; 34°13′ - 37°0′ E. 8 colors. With two insets (1) Jerusalem (Kreis Esch Scherif) 1:250,000 [illegible] colors (2) [The principality of] Lippe (52° N. and 9° E.) on same scale as main map for comparison. Accompanies "Landes- und Volkskunde Palästinas" by G. Hölscher, Leipzig, 1907.

[Excellent physical map of Palestine. Names given in a German transliteration of the Arabic. Typical of the high state of development of cartography in Germany, which makes it possible to publish so good a map as a supplement to a volume selling for 20 cents.]

EUROPE

British Isles. (a) British Isles: Geographical Divisions. [1:5,300,000]. 60° - 49° N.; 11° W.- 2° E. 4 colors.

(b) British Isles Showing the River Systems. Same scale and coordinates as map (a). 3 colors.

(c) Natural regions of Great Britain. [1:9,300,000]. [60° - 49° N.; 8° W. - 2° E.]

Accompany between pp. 46-47, 78-79 and on p. 80, respectively, "Europe (Blackie's Causal Geographies Regionally Treated)" by H. J. Snape, London, 1911.

[Maps (a) and (b) previously published as Pls. XII and XIV of J. W. Gregory's "Geography: Structural, Physical and Comparative", 1908. Map (b) distinguishes between consequent and subsequent rivers.]

France. (a) Carte du glacier des Sources de l'Arc (Maurienne) dressée par M. Paul Girardin. [1:70,000. Scale given as 1:60,000]. [45°25′ N. and 7°5′ E.].

(b) Carte des glaciers du Mulinet, du Grand Méan et des Évettes, dressée par M. Paul Girardin. [1:66,000]. [45°20′ N. and 7°5′ E.].

Accompany, as Figs. VIII and IX, "Revue de Glaciologie. No. 3" by C. Rabot, *Mém. de la Soc. fribourgeoise des Sci. Nat.; Géol. et Géogr.*, Vol. 5, 1909.

Germany. Die Mecklenburgische Schweiz (Malchin, Stavenhagen, Teterow, Dargun u. Anschluss). 1:100,000. [53°55′ - 53°35′ N.; 12°27′ - 13°0′ E.]. 4 colors. Compiled and engraved by: Geographisches Institut Paul Baron, Liegnitz i. Schl. Published by: Hothan'sche Buchhandlung, Malchin.

[Tourist map. Descriptive text on back.]

Great Britain. (a) Physical Map of Berkshire. [1:400,000]. 51°49′ - 51°18′ N.; 1°41′ - 0°34′ W. 4 colors.

(b) Geological Map of Berkshire. Same scale and coordinates as map (a). 12 colors.

(c) England and Wales: Annual Rainfall. [1:6,000,000]. 56½° - 49° N.; 6° W. - 2° E.

Accompany, maps (a) and (b) on inside covers, and map (c) on p. 50, "Cambridge County Geographies: Berkshire" by H. W. Monckton, Cambridge, 1911.

Hungary. Genralkarte des Komitates Turócz Szt. Márton mit den Nachbargebieten. 1:200,000. [49°19′ - 48°38′ N.; 18°21′ - 19°10′ E.] 4 colors. Accompanies "Die Slaven: Ein Urvolk Europas" by M. Zunkovič, Vienna, 1911.

[Extract from the Austrian Generalkarte von Mitteleuropa on which are underlined all places the etymology of whose names indicates their origin as border posts and forts.]

Italy. [Twelve sheets of the various editions of the map of Italy published by the Istituto Geografico Militare Florence, viz.:] (a) Carta d'Italia al 100,000 a tratteggio (price of each sheet L. 1.00). F[ogli]o 204: Lecce. 40°40′ - 40°20′ N.; 17°57′ - 18°27′ E. 1882 (Edizione 1905). Fo. 218: Isili. 40°0′ - 39°40′ N.; 8°57′ - 9°27′ E. 1911. Fo. 219: Lanusei. 40°0′ - 39°40′ N.; 9°27′ - 9°57′ E. 1911. Fo. 226: Mandas. 39°40′ - 39°20′ N.; 8°57′ - 9°27′ E. 1911 Fo. 235: Villasimius. 39°20′ - 39°0′ N.; 9°27′ - 9°57′ E. 1911.

(b) Carta d'Italia al 100,000 policroma senza sfumo. Fo. 171: Gaeta. 41°20′ - 41°0′ N.; 13°27 - 13°57′ E. 3 colors. 1910. Fo. 174: Ariano di Puglia. 41°20′ - 41°0′ N.; 14°57′ - 15°27′ E. 3 colors, 1910. Price L 0.40.

(c) Carta d'Italia al 100,000 policroma a sfumo. Fo. 171: Gaeta. Same coordinates as (b), Fo. 171. 5 colors. 1909. Fo. 174: Ariano di Puglia. Same coordinates as (b), Fo. 174. 5 colors. 1910. Price L. 1 00.

(d) Carta d'Italia al 200,000 a sfumo. Fo. 22: Argentera. 44°40′ - 44°0′ N.; 5°57′ - 6°57′ E. 7 colors. 1910. Price L 1.50. Fo. 23: Cuneo. 44°40′ - 44°0′ N.; 6°57′ - 7°57′ E. 7 colors. 1910. Price L. 1.50. Fo. 28: Ravenna. 44°40′ - 44°0′ N.; 11°57′ - 12°57′ E. 6 colors. 1908.

[Fo. 22 covers hardly any Italian territory—mainly parts of the French Alps.

For references to the editions of the official map of Italy listed under (a), (b), and (c) see "New Maps" under "Italy," *Bull.*, Vol. 43, 1911, p. 960. Index maps of the above 1:100,000 and 1:200,000 editions listed as (b) and (c) under "Italy and Colonies," *Bull.*, Vol. 44, 1912, No. 2, p. 159.]

Norway. Le Folgefonn (Norvège). [1:345,000]. [60°16′ - 59°50′ N.; 6°0′ - 6°40′ E. Accompanies, as Fig. X, "Revue de Glaciologie. No. 3" by C. Rabot, *Mém. de la Soc. fribourgeoise des Sci. Nat.: Géol. et Géogr.*, Vol. 5, 1909.

Scotland. Bartholomew's "Quarter-Inch to Mile Map" of Scotland (Reduced from Bartholomew's Half-Inch Map). 1:253,400. Sheet 1: Sutherland & Caithness. 58°41′ - 57°33′ N.; 5°57′ - 2°57′ W. 13 colors. Sheet 2: Inverness & Skye. 57°43′ - 56°41′ N.; 7°20′ - 4°15′ W. 14 colors. Sheet 3: Aberdeen & Grampians 57°43′ - 56°41′ N.; 4°30′ - 1°45′ W. 14 colors. John Bartholomew & Co., Edinburgh. Price of each sheet, folded between cardboard covers, 1/6.

[Three sheets, comprising the northern half of Scotland, of a new seven-sheet map of Scotland based on the well-known map of Scotland in twenty-nine sheets published by the same firm. With its representation of relief in ten to eleven colors and of roads in red and its legible nomenclature, the map admirably meets the requirements both of the automobilist, for which it is specially intended, and of the geographer. It is such maps as these that have familiarized the general public in the United Kingdom with the nature of good cartography. See also comment under England, *Bull.*, Vol. 43, 1911, p. 958.]

WORLD AND LARGER PARTS

Eastern Mediterranean. Tripolis und das östliche Mittelmeer, der Schauplatz des italienisch-türkischen Konfliktes. 1:3,500,000. 46° - 29° N.; 5° - 38° E. 14 colors. With two insets: (1) Das Vilajet Tripolis und das Mutessariflik Bengasi. 1:7,500,000. 35°-23° N.; 9°-25° E. 5 colors. (2) Die Befestigungen der Stadt Tripolis und ihre Oase, die Mnschîa. 1:125,000. [33° N. and 31 1/5° E.]. 4 colors. Justus Perthes, Gotha, 1911. Price 1 mark.

[Shows routes of Italian mail steamers].

Eurasia and Eastern Africa. (a) Verbreitung und Intensität des Reisbaus auf der Erde. Entworfen von Dr. C. Wachmann. Mercator's projection: equatorial scale 1:100,000,000. 4 colors.

(b) Verbreitung und Intensität des Reisbaus in Asien. Entworfen von Dr. C. Wachmann. 1:30,000,000. 70° N. - 10° S.; 20° [10° W.] - 150° E. 8 colors.

Taf. 3 and 4, "Die geographische Verbreitung des Reisbaus und seine Intensität in den Monsunländer" by C. Wachmann, *Pet. Mitt.*, Vol 58, I, Jan. 1912, pp. 15-16.

[Map (a) shows polar limits and degree of intensity of the rice cultivation of the world. Map (b) indicates, for areas where statistics are available, six degrees of intensity of rice cultivation and, where not, two degrees. Distribution is based mainly on political and not on natural boundaries. The color scheme, too, is ill-suited to express gradational sequence.]

Land Hemisphere, Part of the. The Journey Round the World. [1:80,000,000]. 1 color. With: Comparative Diagram of Distances. Accompanies on front inside cover, "The Full Recognition of Japan" by R. P. Porter, London etc., 1911.

Mediterranean Region and the Nearer East. (a) The Old Testament World. [1:26,000,000]. 44° - 10° N.; 10° W. - 65° E. 4 colors.

(b) The Main Highways of the Ancient Semitic World. [1:6,600,000]. 37° - 28½° N.; 30⅓° - 47° E. 1 color.

(c) The Main Highways of the Roman Empire and the Scenes of Paul's Work. [1:9,500,000]. 43° - 30 N.; 12° - 37° E. 1 color.

Accompany, facing pp. 3, 73 and 82, respectively, "Biblical Geography and History" by C. F. Kent, New York, 1911.

[Map (a) distinguishes between fertile land, arid steppe and desert].

Northern Eurasia. The Siberian Railways, [1:25,000,000]. 78° - 36° N.; 13° - 160° E. 2 colors. Accompanies, facing p. 760, "The Full Recognition of Japan," by R. P. Porter, London, etc., 1911.

[Distinguishes between railroads opened, building, and projected, and shows section of the Trans-Siberian Railway to be double-tracked by 1912. Distances of principal places from Ostende given.]

World. Der Salzegehalt an der Oberfläche der Meere im Verhältnis zur Süsswasserzufuhr der Stromgebiete und zur Höhe der Randegebirge. Mercator's projection: equatorial scale 1:80,000,000. 9 colors. Taf. 2, "Der Salzegehalt der Meere und seine Ursachen" by A. Woeikow, *Pet. Mitt.*, Vol. 58, I, Jan., 1912, pp. 5-8.

[Shows the extent of the drainage basins of the Atlantic (including the Arctic Mediterranean), the Pacific and the Indian Ocean, and also the axes of the principal marginal mountain systems, indicating diagrammatically their mean altitude. The values for salinity are generalized from Schott's standard map, "Die Verteilung des Salzegehalts im Oberflächenwasser der Ozeane," Mercator's projection, equatorial scale 1:80,000,000, Taf. 19, *Pet. Mitt.*, Vol. 48, I, 1902.]

World. Planisphère. Feuille 11: Bassin du Pacifique. 76° N. - 57° S.; 89° E. - 33° W. 11 colors. Feuille II: Océan Atlantique et Océan Indien. 76° N. - 57° S.; 90° W. - 158° E. 11 colors. Both sheets on Mercator's projection: equatorial scale 1:50,000,000. Plates 1 and 2, Atlas Universel de Géographie par Vivien de Saint-Martin et Fr. Schrader. Hachette et Cie., Paris.

[Less individual than the majority of the often remarkable sheets of this atlas. The usual type of map of the world on Mercator's Projection showing political subdivisions, divided, however, into hemispheres allowing of a continuous representation of the Pacific and Atlantic Oceans. Plate 1 incorrectly shows Yap (9°30′ N. and 138°15′ E.) of the Caroline Islands, instead of Guam, as belonging to the United States.]

HISTORICAL

Brazil. Captaincy of S. Vicente in 1553. (After a map of that time [Brasiliæ Pars: Capitania S. Vincentii Cum adjacentibus. 1553-1597]). [1:2,700,000 approx.]. [22⅔° - 25¼° S.; 50° - 43° W.]. Accompanies, on p. 17, "Brazil: Its natural riches and industries," Vol I, Comm. d'Expans. Econ. do Brazil, Paris, 1910.

Brazil. [Seven facsimile maps of places figuring in Brazilian history:]

(a) Plan of Bahía. Arrival of the portuguese [*sic*] fleet on the 29th of March 1625, to chase the Dutch. (After a dutch [*sic*] engraving). [13° S. and 38½° W.].

(b) Attack on Pernambuco by the Dutch in 1630. (After a Dutch engraving). [8° S. and 35° W.].

(c) Plan of Parahyba in 1634. (After a dutch [*sic*] engraving of 1635: [Afbeelding der Stadt en Fortressen von Parayba]). [7° S. and 35° W.].

(d) Plan of Cape Santo-Agostinho harbor in 1636. (After an old engraving). [8°21′ S. and 34°56′ W.].

(e) Rio de Janerio harbour.—Position of the belligerents on the 12th of September 1711. (After an old map). [1:106,000]. [22°54′ S. and 43°10′ W.]. Oriented N. 102° E.

(f) Map of *Rio Grande do Sul* showing the position of the belligerents before the battle of the 1st of april [*sic*] 1776, which compelled the Spaniards to give up this region. [1:180,000?]. 32° S. and 52° W.).

(g) Plan of the colony of Sacramento in 1777. (After a map of the time). [1:9,000]. [20° S. and 4° W.?].

Accompany, on pp. 27, 28, 30, 32, 39, 45 and 47, respectively, "Brazil: Its natural riches and industries," Vol. I, Comm. d'Expans. Econ. do Brazil, Paris, 1910.

Mexico-United States. Earliest Map showing Cibola-Zuñi [by Domingo del Castillo, 1541]. [1:24,000,000]. [Approx.: 37° - 15° N.; 116° - 95 W.]. [Facsimile]. Accompanies, facing p. 120. "The Leading Facts of New Mexican History," Vol. I, by R. E. Twitchell, Cedar Rapids, Ia., 1911.

World. Division of the world *to be discovered* between the Portuguese and the Spaniards, by the treaty of Tordesillas (1494), confirmed by the Pope. [1:215,000,000]. Accompanies, on p. 43, "Brazil: Its natural riches and industries," Vol. I, Comm. d'Expans. Econ. do Brazil, Paris, 1910.

[Two hemispheres divided by the line of demarcation according to the second treaty (approximately 46° W.)].

BULLETIN

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THE PLATEAU OF BRITISH EAST AFRICA AND ITS INHABITANTS

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COASTAL PLAIN

The British East Africa Protectorate, like all of the contiguous territory, is a great plateau which averages several thousand feet above sea level. The plateau is fronted by a narrow coastal plain of uplifted coral rock, porous and brecciated in character, and reduced by marine erosion to a flat, featureless plain. The plain varies in width from two to ten miles and on the average is about thirty feet above the sea. It is covered by a thin residual soil on which a tropical jungle subsists. Bird and animal life is abundant and in certain small areas the plain is thronged with natives. The shore line of this plain is relatively smooth, and consists of low cliffs alternating with beaches of coralline sand. A number of minor oscillations have affected the coast belt in recent geological time, the last of these movements being a negative one, resulting in the drowning of stream debouchures and the consequent formation of wide and irregular estuaries. These estuaries, or so-called lagoons, cause most of the irregularities in the coast line, and give rise to the only safe type of harbor to be found on the east coast of Africa. Kilindini harbor, at the south end of Mombasa island, one of the most commodious and splendid harbors in the world, results, for example, from the drowning of several small streams which enter the sea in close proximity.

The east coast of Africa is one of the world's great coral regions. The coast pilots say that, with a few interruptions, such as that off the mouth of the Zambesi river, the coral extends from Somaliland southward to the neighborhood of Delagoa Bay, a distance of over 2,000 miles. Reefs obstruct the entrances to all harbors to such an extent that access is generally difficult, and thus the prosperity of the whole region is seriously menaced. Both fringing and barrier reefs are in process of formation in great numbers off the East African coast. In general they lie parallel to the shore, and in many instances have been built up to the surface of the water, so that sand is accumulating upon them. This is true of barrier reefs several miles from shore, as may be seen between Zanzibar and Mombasa. A slight elevation of the sea bottom would extend the coastal plan seaward for several miles.

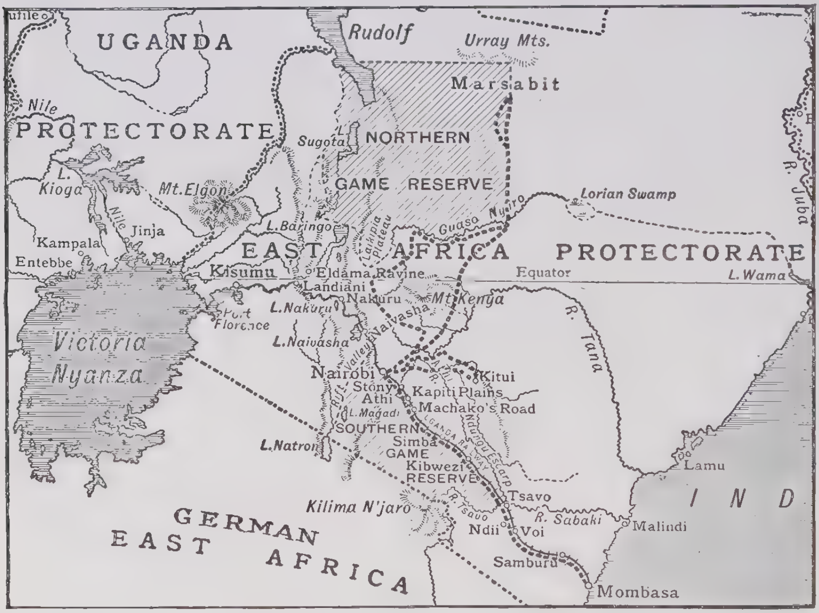

Fig. 1—British East Africa.

The coastal plain is well adapted for agriculture, especially fruit raising, when once it is cleared of the forest covering. The natives have in many instances thus cleared small patches or shambas for the purpose of supplying the native markets with various products of the soil. Nevertheless, the population is still small and the resources of the plain are poorly developed. For example, Mombasa, the most important port of East Africa, has been for centuries a center of trade and of Arab and European influence, yet it is still possible to shoot buffalo, elephants and other forms of large game within a radius of eight or ten miles of this long settled community.

PEOPLE OF THE COASTAL PLAIN

Arabs and Indians have succeeded in securing the most desirable agricultural areas and have dispossessed the weaker and less intelligent negro native and forced him into other types of employment. The negro is not the only one, however, who is losing ground. The Arab, who has been in the land for centuries, is being steadily and mercilessly displaced by Goanese and East Indians, who are coming to British East Africa in large numbers. An interesting transference of allegiance from the old Arab master to the new and more resourceful Hindu master is taking place at the present day.

It is a pity from many standpoints that the unscrupulous though skillful Indian has come to East Africa in such numbers. The negro is adjusted to the Arab, his ideas and his methods, he knows how to accept him and what to expect from him. He is yet to be adjusted to this new human environment, and what the outcome of this new relationship is to be is now difficult to predict. The Indian is but a careless and indifferent workman and serious complaint of his inefficiency and slovenliness is to be heard all along the Uganda railroad, where he is largely employed. This sort of an example is bad for the negro. The Indian is not the kind of civilizer the native needs in his present stage of development. The forced contact of the two races in the last decade or two has raised a serious problem for the British Government.

Most of the natives who live on the coastal plain are Swahilis of mixed Negro and Arab descent. Although the Arab has been a curse to the African, yet in many ways he has been a blessing, even though it be in disguise. For example, he has changed the coast negro from a dirty, inefficient savage to a well clothed, law abiding, resourceful laborer. The Swahili, to quite a degree, has dropped his Mumbo-Jumbo religion, his fetishism and his charms and has taken on, outwardly at least, a more advanced type of religion in the form of Mohammedanism. The change, however, is in many ways only skin deep. It is rare, for instance, to see a native praying with his face Mecca-ward or in any other direction, as compared with his Arab or Indian neighbor, yet even thus he has advanced religiously, thanks to his Arab mentors. The coast Swahili has in many ways adapted himself to sea conditions. For instance, he is a good navigator and boatman, and a great fisherman. As a natural result he is employed frequently on the liners plying between East Africa and Europe or India. The infusion of Arab blood in his veins has apparently given him certain qualities of leadership and of organization, as well as certain commercial tendencies, which are largely wanting in the timid, unaggressive native of the interior. The Swahili language has borrowed an extensive vocabulary from the Arabic, and has become the *lingua franca* of East Africa, indispensable to all who travel or trade in that land. The Swahili is thus at a great advantage over other natives, and has therefore become a necessary factor in the organization of safaris, or expeditions into the interior, and in much of the native commerce of the country.

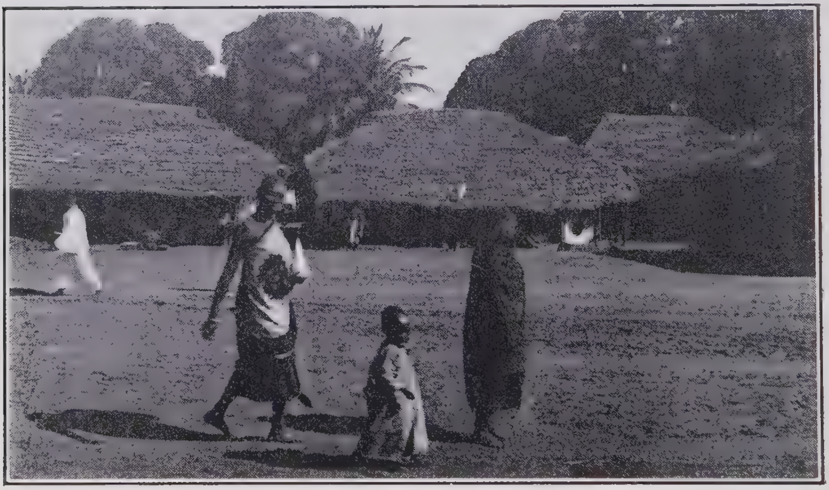

Fig. 2—In the Native Village. Mombasa.

The houses of the natives on the coastal plain illustrate not alone the characteristics of their architecture but show how the native is able to use whatever material happens to be at hand. The houses consist of a frame-work of poles tied together with bark. The space between the poles is filled in with mud and fragments of coral rock, while the roof is thatched with leaves obtained from the groves that surround the habitations. Almost the only article of furniture is the bed, a rectangular frame of poles placed on four legs, with native cord stretched across at intervals much after the fashion of the old cord beds of our fathers.

What has been said above applies only to certain parts of the coastal plain. Many portions are not inhabited save by wandering tribes, who stay but a few days in any given locality. Except on the sea coast and along the Uganda railway and the old caravan routes, much of the plain is a real terra incognita.

THE PLATEAU

The plateau rises from the coastal plain somewhat abruptly to a height of 200 feet, then, by a gradient which is on the whole more gradual, to a height of 8,000 to 10,000 feet at the crest of the escarpment on the western side of the Rift Valley, 450 miles from the Indian ocean. From this lofty summit there is an abrupt descent into the Nile basin, for it is to be remembered that the Nile valley is carved out of this great plateau.

The rainfall over much of the region under discussion is variable and scanty. It comes in two seasons, separated by months of dry weather. The "Big rains" fall from March to June, when the movement of the sun carries the belt of equatorial rains northward, the "Little rains" in November and December, when the sun returns to the south of the equator. The drought of the dry months is so serious, that it outweighs the good results of the rains. Vegetation, though abundant, is a stunted, scrub-like growth of an arid type. It has of necessity adjusted itself to the dry seasons rather than the humid portions of the year.

Exceptions to this general statement regarding rainfall are found along a narrow belt on the coast, where for a few miles inland the rains are fairly well distributed through the year by reason of the trade winds. Again, the loftier parts of the high plateau, those portions above 5,000 feet or so, are likely to receive more rain than the lower areas. The higher monadnocks of the plateau, which will be described later, receive quite abundant rains on their summit, even when comparatively little falls at the base. The higher portions of the plateau in the neighborhood of the Rift Valley are also well watered, insomuch that great forests grow there in tropical luxuriance, forming a marked contrast to the scrub-covered plains only a few miles away. Finally, the western slopes of the plateau receive the heaviest rainfall, about sixty inches per annum. This fact accounts in large part for the tremendous erosion which has taken place here and which has resulted in the development of the Victoria Nyanza Basin and the Nile Valley that opens from it to the north. This great precipitation is due apparently to moisture laden winds which follow up the Congo Basin from the Atlantic. As they are carried up the westward face of the plateau and over its lofty summits they precipitate their contents in the form of frequent showers.

This circumstance is apparently a large factor in maintaining the Nile and in determining the position of its valley.

Except in the regions just described, the rainfall is so scanty that no well-defined drainage systems can be maintained. Over the larger part of the plateau the streams are intermittent, flowing in wide, shallow valleys. There are no deep valleys, no cañons, no well-incised ravines, no trunk stream flowing permanently into the sea.

On the basis of the underlying terranes and their character, the plateau may be divided into a number of provinces. These provinces are long and comparatively narrow regions, extending in a northerly-southerly direction. The easternmost province, adjoining the coastal plain along the Indian ocean, is underlaid by sedimentary rocks. It represents an earlier coastal plain, which in late Jurassic time was uplifted from the sea and has been carried to its present altitude of several hundred feet by a number of oscillatory movments. The shales and sandstones of the area are easily eroded, and where there is much rainfall the region is thoroughly dissected, presenting numerous hills and valleys with notable relief.

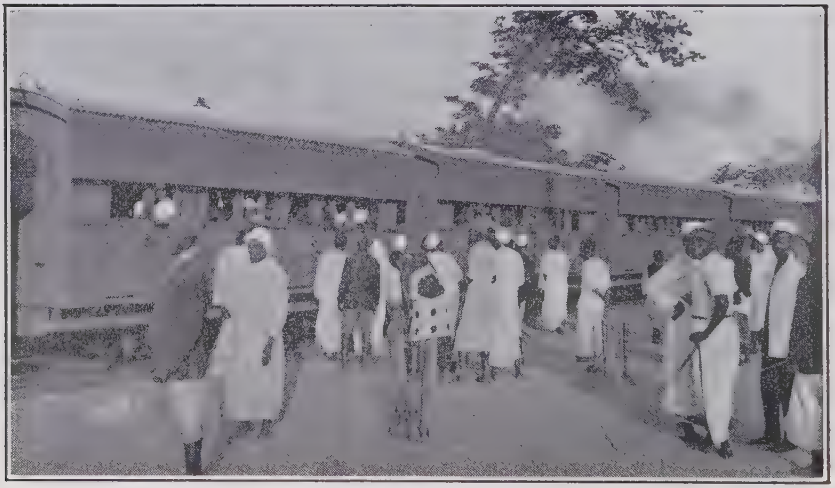

FIG. 3—Swahilis at a railroad station.

As one proceeds westward, the shambas, or cultivated plots of cocoanut and banana, which are abundant in this seaward province, are left behind, and an open, park-like country follows. This region is gently rolling, and is covered with grass, a good pasture-land, where many flocks of native cattle and goats, and at times herds of game, are browsing. Still further westward, but nevertheless only thirty miles from the sea, the rainfall begins to be less, and the flat, monotonous country is covered with thickets of scrub, uninhabited either by man or beast.

The next province is underlaid by a gneiss, which is the foundation rock of the whole plateau. This province is about 200 miles wide, and is a well-dissected area with numerous residual monadnocks, which rise to a height of 2,000 or 2,500 feet above the plain. These residuals usually trend parallel to the foliation of the gneiss, namely N.N.W.–S.S.E. Some of the larger monadnocks rise to the dignity of mountain ranges. They are lofty and massive features of the landscape, whose summits are sometimes clothed by forests among which dwell tribes of agricultural negroes. The plains below are flat, dry, débris-laden areas covered with thorny mimosas, Euphorbias and other types of arid vegetation. Numerous lava flows cover parts of the gneissic area, and are often of such great extent as to have a marked influence upon the topography. They frequently form angular, flat-topped buttes and mesas, while the gneissic remnants, that is, the monadnocks, are usually ridges with undulatory summits.

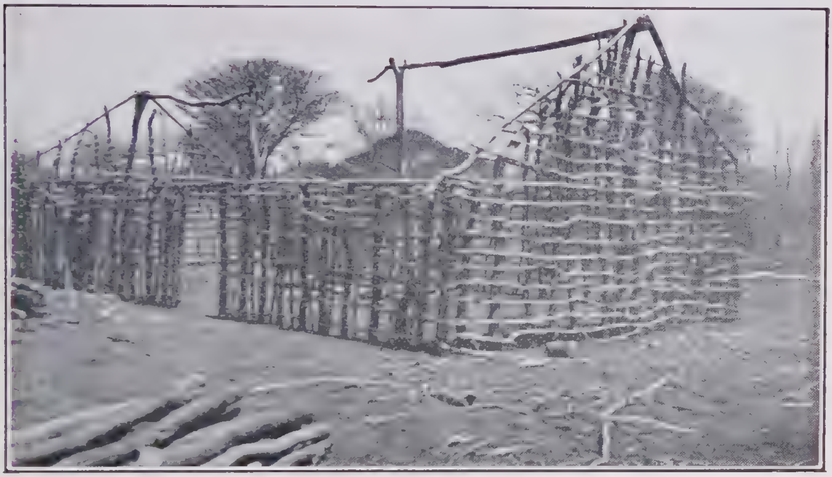

FIG. 4—Native House in the Making. Makindu.

Toward the west the gneiss begins to be covered by vast and continuous lava flows from the Rift Valley, and their presence introduces another province, which may be called the Lava province. Originally the gneissic province extended from the ocean at least to the shores of Victoria Nyanza, but the portion now under discussion is buried to a greater or less depth by lava. Some of the earlier flows were relatively thin and were guided largely by the original gneiss slopes. In such instances the lava barely masks the older surface, as is seen, for example, in such striking examples as the wide, flat expanses of the Kapiti and Athi plains. The Lava province is about 220 miles in width. Its middle portion is interrupted by that vast graben known as the Rift Valley. The lava seems to prevail throughout the entire Rift, the formation of that valley having caused in part the extravasation of the lava which has poured forth in such abundance on either side. If the lavas exist in such quantities throughout the length of the Rift, as they do in British East Africa, then this belt is by far the most extensive lava area on the globe.

THE RIFT VALLEY

The Rift Valley is a great trough fault which trends from north to south through the lava belt. It is the most stupendous feature of its kind on the globe. A first view of it from the edge of one of the escarpments is never to be forgotten as it spreads out before the observer in all its vastness and mystery. Its maximum depth below the plateau is about 2,000 feet. Its width from east to west, where the Uganda railroad crosses it, is about eighty miles, while the floor averages perhaps forty miles in width. The walls of the valley consist of a series of scarps and platforms, caused by the movements of great fault blocks which have pitched about in various directions in the effort to adjust themselves to the sinking crust. The number of scarps varies; sometimes there are but two, more commonly three, rarely four or more. The scarps are generally several hundred feet high and are somewhat modified by erosion, especially on the west side of the valley, where the rainfall is greater. The essential features of the valley sides are, however, due to the movements of the great fault blocks themselves. The blocks may reach a length of several miles and a width of a mile or so. The varying size of the blocks and their different inclinations introduce a diverse topography in which faulting is the sole factor. The upper scarps and platforms are covered with tropical forests, while the floor and the lower scarps, in marked contrast, are scantily covered with arid vegetation, so great is the difference in rainfall between the upper and lower wall of the valley. The floor of the Rift is made up of a series of basins, probably of tectonic origin, and containing in some cases alkaline lakes. The valley, as a whole, is an area of accumulation; no streams drain it outwardly and no débris passes from it. Great quantities of detritus are swept into it from the encompassing walls in the form of fans, whose material is gradually spread out over the floor and results in its aggradation.

A lofty but relatively narrow divide separates the Rift from the Nile basin. As already indicated, this region is being attacked by erosion on its west face in a very marked way and is destined to disappear in a short time, geologically speaking. With the divide removed, the drainage of the Rift will be added to that of the Nile, its aridity will disappear and a large region become fitted for human occupation.

THE PEOPLE OF THE PLATEAU

For the most part the natives of the plateau have a less admixture of foreign blood than the coast natives, and are therefore of relatively pure negro stock. Generally, they are agriculturists and work the soil in their careless, improvident way. Over much of the plateau, with the exceptions already noted, the rainfall is too scanty and fluctuating to afford certainty in agricultural operations. Hence, there are large areas of the plateau which are uninhabited by permanent peoples; for the natives are forced to occupy the higher hills and the loftier parts of the plateau, where rainfall is more abundant. The Duruma tribe, for example, live on the higher summits of the Sagala hills southwest of Voi, and they manage to live in comfort, but would starve to death on the arid plains below. It is sometimes hinted by travelers that this withdrawal has been due to fear of

FIG. 5—Railroad Laborers on Work Train.

slave-raiders, but in any case they would be obliged to live on the heights, where the needful rainfall is sufficient. Thus, too, the Kikuyu tribe occupy the high plateau about Nairobi and to the westward, toward the Rift Valley, where rainfall is abundant and assures them the needed food supply. This family is typical of the agricultural or "Hoe-people" group. They cultivate shambas of a few acres in extent, upon which they raise corn, yams, manioc, millet, ground-nuts, bananas, etc. The women do much of the rough work, turning up the ground with their rude mattock-like hoes and harvesting the crop at the end. Generally, there is a baby fastened on each woman's back, its poor little head rolling too and fro with the motions of the mother as she bends to her arduous toil, while its face is covered with dust, perspiration and flies. The harvested crop is frequently kept in small, grass-thatched granaries. As soon as the harvest is reaped the land is burned over to rid it of weeds and then planted almost immediately to a new crop.

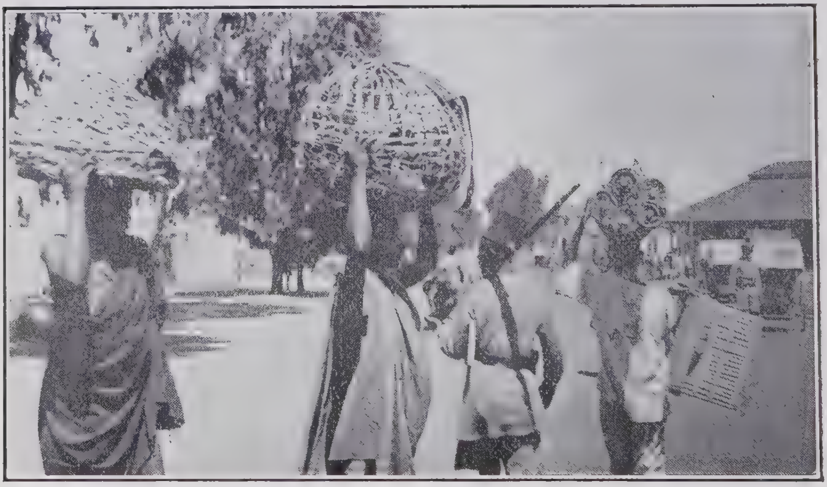

FIG. 6—Chicken Peddlers and a Native Policeman at Nairobi.

There is little rotation of crops, and little fertilizing of the land, so that the soil is overworked and soon depleted. When it has lost its fertility and fails to produce an average crop, the native abandons his shamba and seeks new quarters. He may locate on the grasslands or he may clear another patch in the forest. Apparently this method of procedure has been carried on from time immemorial. Generation after generation has gone about depleting the land until large areas have become unfit for agricultural operations. The gneissic nature of the underlying rock, over wide regions, also tends to make the soil acidic in character and somewhat infertile at best, and the native methods only add to its natural poverty.

The Kikuyu is very adaptable, he knows how to make use of branches, leaves or grass in forming a cover and he is able in short order to construct a bee hive hut, which will serve as a shelter while he needs it. Especially in the forest regions, numerous grass covered huts, singly or in groups, are to be seen. There is no opening into the hut except the low door, which compels crawling in on all fours. The Kikuyu is a master of circumstance in his own environment and is able to meet situations effectively, where a white man would be helpless. In a similar way he adjusts himself to the use of all types of foods, cooked or uncooked, clean or unclean; everything is grist that comes to his hopper. He will dig up a manioc root, knock off the dirt, gnaw off the cortex, spit it out, then proceed to eat the root in a raw state. On the other hand, he may make more elaborate preparations, he may utilize the native mortars to pound up corn or millet into a coarse meal, from which he may make a native bread or eat it in the form of mush. On the whole, he is one of the most industrious among African peoples.

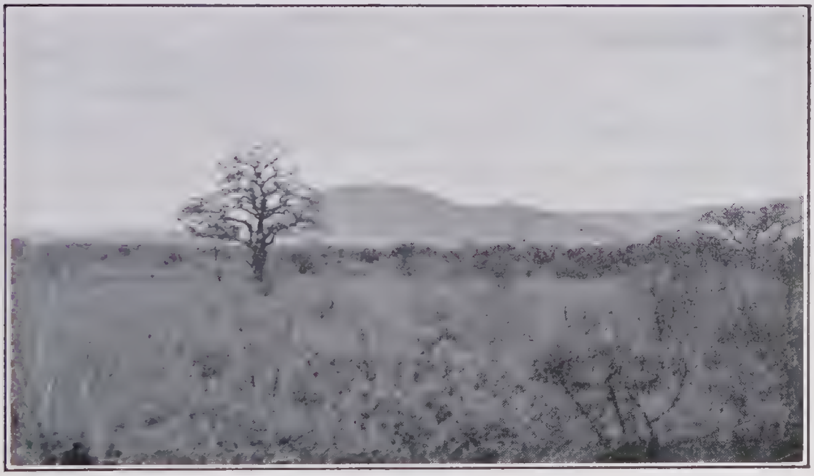

Fig. 7—Gneiss Monadnock near Voi.

The natives of the interior wear little clothing as a rule. When they have been converted to Mohammedanism they wear the long flowing robes of the Arabian, or if they are anglicized they may don the cast off knee-breeches and sweaters of their erstwhile masters.

The ordinary heathen, however, wears a piece of cotton cloth tied over one shoulder and allowed to drape itself about the body as it will. He daubs his cloth with grease and red clay to make it water proof. In the same way he smears over his body a mixture of tallow and clay, including head and hair. This coloring matter is rarely put on in the form of a pattern and is not intended, solely. at least, for purposes of ornament, but rather for the utilitarian object of protection from heat and insects.

Ear ornamentation is the most notable type of personal adornment among the natives of the plateau. Both the shell of the ear and the lobe are loaded down with all sorts of materials, wood, metal, paper, and stone. The lobe of the ear is pierced and then stretched until it will admit a stone weighing several ounces or even a jam can. Sticks and cigarettes are thrust into the holes bored around the shell of the ear. In walking through the country, especially in the neighborhood of the Uganda railroad, one frequently meets groups of these natives adorned in this way and armed with spears and clubs. Generally, they pass in silence, but occasionally some one will call out the native salutation "Hujambo Bwana," which being interpreted is "How do you do, master."

An entirely different type of native inhabits the Rift Valley, namely, the Masai, a Nilotic people, who have pushed their way up the Rift and wedged themselves in between the negro tribes of the uplands. The valley has been a great highway up which they could travel far from their origin. Like a river, this mixed people has swept southward, between banks of negroes as it were, on either hand.

The Masai are a pastoral race and the semi-arid valley is well adapted to their mode of life. Though they have negro blood in their veins, they are very unlike the surrounding agricultural Bantus. This is noticeable in their physique, habits of life, customs, modes of building and the like. For example, they do not build the grass hut of the upland negro, but use a type of house better fitted for a cattle raising people. First of all, a great enclosure of palings is constructed, within which they build their crude brush huts. These are wretched homes, much more exposed than the negro huts, and far inferior to them from the standpoint of construction, but they are well ventilated and the smoke freely escapes. Within the large enclosure the flocks are driven at night as a measure of protection against wild beasts. One of the common sights about these kraals in the morning hours is to see women busy at work repairing the fence or rebuilding decadent portions of it.

In their methods of ornamentation, the Masai tend to use skins, tails and horns of animals, as befits a pastoral people. They are not averse to the chase and with their long-headed iron spears are able to hold their own even with lion or leopard.

The Rift Valley has had a marked influence upon the distribution of this race, and the accident of a geological convulsion has permitted them to go far afield and to be brought closely into contact with a contrasting people. It is rarely the case that conditions will permit two peoples to be brought into such close contact unless one is dispossessing the other and pushing its way onward at the expense of the other. Here in East Africa these two unlike races dwell side by side because each has its own appropriate environment. They do not need to invade each other's territory since a geological accident has caused the juxtaposition of two regions in which unlike peoples can dwell without interfering seriously with each other. In some cases, as among the Lumbwa, the Masai have overflowed the banks of the valley and settled on the higher plateau, but these are exceptional instances.

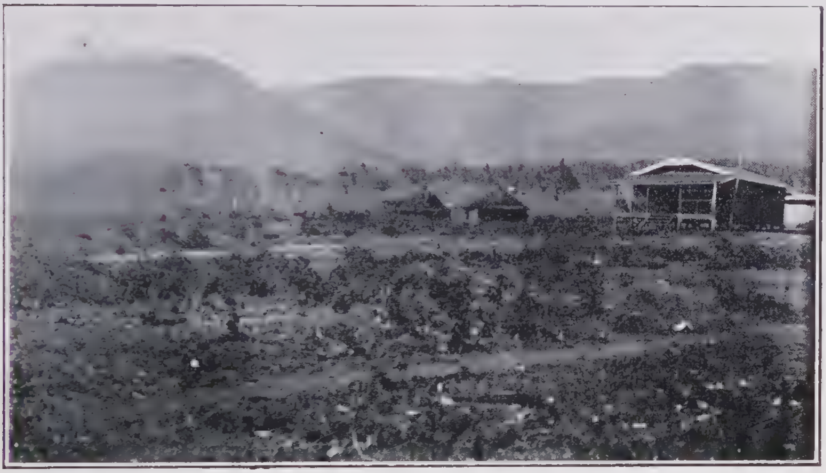

Fig. 8—Fault Escarpments. Rift Valley.

Within the Victoria Nyanza basin, to the west of the Rift Valley, conditions again favor agriculture, and here dwell numerous tribes who make their living from the soil. Some of them, like the Kavirondo, are unique beyond degree, well worthy of study from the viewpoint of the geographer, both in their relation to the land and in regard to their utilization of the products which nature has offered them. These peoples, like all those on the great African plateau, illustrate anew the truth, that all aborigines are adjusted to their surroundings as accurately and efficiently as the fauna and flora, in whose midst they dwell. They are the survivors who have proven their fitness to live and to people the land.

TOPOLOGY, TOPOGRAPHY AND TOPOMETRY

BY

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The recent discussion in the "Annales de Géographie" between Prof. Paul Girardin and Général Berthaut on the concepts of Topology, Topography, and Topometry,* following upon the publication of Berthaut's two-volume work entitled "Topologie," seems of sufficient importance to deserve being brought to the attention of American geographers, topographers, and engineers. In this country we still content ourselves with the single term "topography," applying the same rather loosely, and in some respects inaptly, to different classes of work. The truth is that we have not yet come to separate sharply in our minds the three closely allied concepts for which the French have already for several years found it desirable to employ different terms.

The topographic map work carried on in this country, principally by the government, is recognizedly of a high order, and appreciation of its merit has been repeatedly expressed by European topographers. Nevertheless, the fact remains that we have in the United States no distinct "topographic profession," nor anything resembling a formulated science of topography. With us, topographic mapping, however excellent its results, is little more than a specialized class of surveying and drafting, and our topographers do not, on the whole, lay claim to being anything further than specially trained surveyors and draftsmen. To those familiar with the trend of geologic, and more especially of geographic science, in this country, however, it must be clear that if the topographer intends in the future to keep step with the geologist and the geographer; if the mapmaker's work

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*Paul Girardin, Topologie et Topographie. A propos de l'ouvrage de Gén. Berthaut, *Ann. de Géogr.* Vol. XX, Nov. 15, 1911, pp. 385–395.

Gén. Berthaut, Topologie, Topographie et Topométrie, *ibid*, Vol. XXI, Jan. 15, 1912, pp. 73–80.

is to continue adequately to meet the constantly more exacting requirements of the map user, then the time is not far distant when the former will have seriously to consider placing his work on a higher and more scientific plane. It will not suffice for him merely to keep on increasing the accuracy of his measurements and the skill of his hand. However essential surveying control, so-called, and drafting skill may be, they are not the "Alpha and Omega" of topographic mapping. What the topographer will have to do, sooner or later, is to acquire an insight into the nature of land forms, and to systematize this knowledge so that it will provide him with a definite basis for the planning of the engineering parts of his work. It is only in this way that he will be able to furnish without fail, or without preliminary and costly experimenting, the data required in any instance with the precision demanded and yet with true economy.

It was with this idea in mind that the writer, some six years ago, addressed himself to the task of working out, at least tentatively, a general groundwork upon which such a system of rationalized topography might be built. An essential part of that groundwork appeared to be a classification of detail forms, "topographic units," as the writer has frequently called them ("Einzelförme," is the German word), the delineation of which constitutes the topographer's principal work. An outline of this classification he presented before the Association of American Geographers, at the Baltimore meeting, under the title of "The Topographer's A B C of Land Forms."

It occurred to him at the outset that this study, although resting chiefly on physiography, constitutes a field of inquiry distinct from that science and not to be confused with it. It is inherently a topographer's study, and its object is a purely topographic one. In seeking a name by which to designate the new science, the desirability at once suggested itself of finding a term that might stand in apposition to that of "topography," which denotes the corresponding art. "Topology" manifestly was the logical word, but when the writer opened the Century Dictionary to see if the term might possibly be in use elsewhere, what was his dismay to discover that "topology" stands for "the art or method of assisting the memory by associating the thing, or subject, to be remembered with some place." Considering the term definitely preëmpted, he closed the book with a sigh and began to look in other directions for a convenient word,—thus far, however, without success. One may imagine his delight, therefore, upon finding upon his desk one day two ponderous tomes in French proudly bearing the one-word title "Topologie," and treating of the very science for which he had himself selected that term.

"A la bonheur!" he exclaimed, "that settles it!" We may incur the wrath of the mnemonician by thus appropriating his term, perhaps, but what of that, there are not many of him in the land. Besides, it is not the first instance on record of a term being used in utterly different meanings by separate sciences whose provinces are so widely remote from one another that there cannot possibly ever be a clash.

In the meanwhile "topologie" has been in use among French topographers these ten years, and bids fair to stay. Let us hope it may. There is need of such a term. The new science for which it stands, but barely out of the egg, needs careful nurturing, and the first step required to establish it and secure it recognition is to give it a name coupled with a definition. Berthaut's definition, as given in the foreword to his work on "Topologie," is: "Nous entendons par *topologie* l'étude raisonée des formes topographiques;" the analytical study of topographic forms, to give a close translation. This he hastens to amplify by saying that the land forms referred to are not those larger ones constituting broad areal units of geographic importance, but those minor ones whose delineation requires fairly large scales of mapping, topographic scales rather than geographic scales. Topology is essentially a detail study, which, while it may be conceived to lie within the province of physiography (géographie physique, as it is termed in France), nevertheless comprises a separate field having a specific object. In his reply to Girardin, Berthaut states what that object is: "The principal object of topology, as conceived by the Service Géographique de l'Armée, is to furnish the topographer with the analytical elements of the forms of the relief, for the more thoroughly these forms are understood by the topographer the more successful will he be in their delineation. Reciprocally, the better the land forms have been delineated by a topographer, who knew how to bring out their characteristics, the more valuable will his topographic document be in shedding light upon the nature of the relief, the underlying structure, the erosional forces to which these structures have been exposed, etc.—all information of an implicit sort, which will be eagerly seized upon by those able to read it."

To all this the present writer promptly responds with a hearty, loud amen! His own experience has abundantly proven the soundness of Berthaut's contentions. No topographer who would aspire to give maximum value to his work, can hope to do so if he lacks an intelligent insight into the nature of land forms. Let there be no illusion on this score; the lack of intelligent understanding on the part of the uninformed delineator speaks from every line he draws;

betrays itself in the meaningless, wooden forms that characterize his sketches, in the evident crudeness of his conceptions of nature's work. These defects may pass unnoticed by the undiscerning, but they are nothing short of galling to those to whom every curve and flexure in a contour has a meaning,—and it is just these who in their own research most rely upon and most heartily appreciate good topography.

A few topographers there are, no doubt, with whom an understanding of the relief is intuitive, but with the rank and file such is certainly not the case. For them, the only way to acquire an understanding is by patient study and close observation. Unfortunately, hitherto, there has been no book treating the subject of topographic forms in a manner specially designed to meet their needs. Well-meaning attempts have been made in this country, at one time or another, to supply the topographer with lessons in pure geology. But geology is not what he needs, and the aforesaid attempts have only resulted thus far in intensifying his prejudice against that science, a prejudice that may be likened to the loathing displayed by high school girls to algebra and other studies which they instinctively feel to be foreign to and useless in the sphere of their future activities. It is sincerely to be hoped, now that Berthaut's "Topologie" has given a new impetus to the study of land forms by French topographers, that a similar work may soon appear on this side of the Atlantic for the inspiration of American topographers. Such a work might well go one step further than Berthaut's, and, besides explaining the genesis of the different topographic types, attempt to lay down some principles governing the generalizing and simplifying of minor details, not fully delineable on small scale maps. How this generalizing is to be effected, and how far it is to be carried in any instance, are problems that inevitably confront the topographer who is working on much reduced scales; indeed, they are among the most perplexing problems with which he has to deal. Thus far he has been left to solve them for himself, but the unsatisfactoriness of the result must be obvious to any one who has noted the wide diversities in style of treatment so often characterizing maps drawn by different men. In topographic delineation, as in writing, generalizing is largely a matter of judgment not amenable to rigid rule, and there must always be some room for the expression of individuality. But this is not equivalent to saying that it is impossible to minimize these differences in treatment, or that it is utterly useless, as some would claim, to try to formulate principles that will tend to unify the practice. On the contrary, the divergence in judgment shown by different delineators plainly indicates that the topographic art is still largely on an empirical basis, that its fundaments have not yet been worked out, and that much could be done to guide the individual in his judgment. As a matter of fact there do exist certain basic principles for the generalizing of topographic details on maps of different scales, and it is high time that they be announced, so that there may be a uniform understanding of them among all topographers.

There are those, no doubt, who will reply to all this that topographic mapping, in the end, is nothing but a matter of engineering, and that the topographer merely need multiply his measurements in order to obtain a representation that will be accurate and reliable throughout. But this view rests upon a misconception, a failure to distinguish between maps, the limitations of whose scales preclude the rendering of the relief feature for feature, down to the merest minutiæ, and those large-scale maps upon which not merely all features can be delineated in detail, but upon which these features are measured in with mathematical accuracy, practically nothing being "sketched in" by eye. The French have long since recognized the desirability of differentiating between these two classes of maps, designating the latter "topometric maps," while reserving for the former the old term "topographic maps." Topometric maps, accordingly, are maps of high precision. The contour lines upon them are in many instances run out individually by instrumental methods, and the forms of the land are treated in the same rigorous fashion as roads, fences and other cultural features. Indeed, such maps are little else than high-grade surveyor's plats, aiming to furnish a representation of the ground sufficiently accurate for the planning of engineering works and the making of preliminary estimates. They are, of course, prepared on relatively large scales, such as 1:20,000, 1:10,000, 1:1,000 and larger.

Clearly such maps belong to a different category from those properly called topographic, whose aim it is to portray considerable areas of land with their characteristic configurations. These do not pretend to be exact replicas of the relief in miniature,—rather, they partake of the nature of abstracts,—generalized statements serving to bring out essentials, at the sacrifice, purposely, of irrelevant detail. Among the most familiar examples of this type of map are the topographic atlas sheets issued by the U. S. Geological Survey (special large-scale maps, such as those of the Yazoo Basin in Mississippi, for instance, excepted, to which the term topometric rightfully applies). The scales of the atlas sheets are for the most part 1:62,500, 1:125,000, 1:250,000, but there are a few instances where larger scales have been used, such as 1:48,000, 1:31,680, and 1:24,000. In Europe the prevailing scales are 1:20,000, 1:50,000, 1:100,000, and 1:200,000.

It stands to reason that there can be no sharp line of demarcation between topographic and topometric maps; the two naturally grade into each other. There is often a little topographic sketching on a topometric map, as in the more rugged portions of the large-scale Sacramento Valley sheets; again, there is of necessity much topometric work involved in the preparation of a high-grade topographic map. Nevertheless the distinction is a useful one, and could it only become as firmly rooted in the minds of our geographers and engineers, as it is with their French brethren, the haziness of ideas still prevailing in this country on the subject of topographic mapping would soon be dispelled. There would come to be a truer appreciation of the difference in status of the two kinds of map work and of the two professions which they represent. It would become clear, on the one hand, that topometry is essentially a branch of engineering, involving surveying and drafting of a specialized sort, and that the value of a topometric map is to be gauged primarily by its quantitative exactness. It would be recognized, on the other hand, that topography is something more than engineering, requiring for its best results a technical equipment far beyond the training surveyors or draftsmen ordinarily command. There would cease to be any further illusion about the province of topography, which is the presentation of topographic facts in condensed form; nor about its nature, which is in part that of an interpretative and synthetic art. Finally, it would be granted that there can be no hope for anything like uniform and systematic delineation until the science of land forms—topology—has been formulated and all topographers alike shall be schooled in its principles.

Whether or no we care to adopt in this country the two new terms topology and topometry, we shall hardly err in taking cognizance of the concepts for which they stand, and in thus vitalizing our own thought in the domain of topography and topographic science.

THE TECHNIQUE OF ARCTIC WINTER TRAVEL*

BY

V. STEFÀNSSON

It is a world rule (with its inevitable exceptions) that the members of a craft hand over to their fellow-craftsmen and successors the knowledge gained by experience and the wisdom that comes from failure. Among the conspicuous exceptions to the rule are arctic travelers. A farmer who finds an expensive fertilizer inferior to a cheaper one usually writes a letter forthwith to an agricultural journal, but a traveler who finds the sleds used by the distinguished traveler X decidedly inferior to those sold to "mushers" at Nome ordinarily refrains from saying a word about it—probably for one of three reasons: he wants to keep the knowledge for his own exclusive benefit, he is afraid of offending the distinguished X, or his publisher hints broadly that the man in the street prefers rhapsodies on polar sunsets and December auroras to technical discussions of carpentry. Accordingly a reading of modern arctic books from Parry to Peary is of disappointingly little value to one seeking light on the technique of snow and ice travel. This statement requires some qualification, however, for is there not Julius Payer with an entire chapter of "practical suggestions," and do we not have minutiæ of sled-building and sled-loading in Nansen's delightful "Farthest North"? There are suggestions, too, by Greely and by Rae, and by several others; there is much wisdom with Peary if one reads between the lines. But it is only to the man of experience that this interlineation is legible, and it is the man without experience who most needs the advice, for it has been true in the past, and will probably hold for the future, that half of the more pretentious polar expeditions are commanded by men without experience who do not suspect the trials that await them and who are so completely discredited by the failure of their first venture that they do not get a second chance to retrieve their fortunes and profit by their failure, even when they do not pay with their lives for their lack of knowledge and for their misknowledge.

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* The author wishes it stated that, when this paper was written, he had no opportunity of knowing of the publication of Peary's "The North Pole" or of consulting it with reference to the technique of arctic travel.

Attention may be called to a former contribution by the author, entitled "Suitability of Eskimo Methods of Winter Travel in Scientific Exploration," in the *Bulletin*, Vol. 40, 1908, pp. 210–213.

But evidently mere railing will do little good. A crust will do more to relieve hunger than will a pulpit discourse on loaves and fishes. The writer is unfortunately neither by years nor experience a commanding authority on even one detail of arctic procedure; his experiences should, however, be of value to those of less experience or of none; his opinions may also possibly have the good fortune to attract the eye of some well-informed dissenter who will feel called upon in consequence to expose a fallacy or two and thus break the embargo he has hitherto placed upon his wisdom.

In one field, too, the writer has experience exceeded by only a few scientific travelers or explorers of cold countries, for he has driven dog-sleds more than 5,000 miles through rough sea ice, across level coastal plains and among arctic mountains—three sets of conditions which comprehend the sum of possible arctic sledging experiences. Accordingly, if he is going to contribute an essay on the technique of arctic exploration, sleds and sled dogs are for him the self-chosen topic. Most men of experience are agreed, too, that this is a subject of the gravest import to one preparing a venture for the north; together with the allied topics of winter clothing and campbuilding we have in it the body of nine-tenths of the traveler's winter lore.

Nansen and his successors, both in point-blank statements and by the pride with which they point to the lightness of their equipment, make strength and lightness almost co-ordinate prime requisites in a good sled. From this point of view many men of experience differ and the writer would go so far as to make the paradoxical statement that an ounce of strength is worth a pound of lightness. Or, to put the same idea more sensibly and definitely: if a sled weighing 75 lbs. carrying a 600 lb. load will withstand a shock x, a sled weighing 150 lbs. carrying the same load would be by far the preferable sled if it could withstand a shock of $2x$ violence. In other words, doubling the strength of a sled, though you double its weight too, more than doubles its value for rough work. But it is easily possible to more than double the strength of a sled without doubling its weight, and this makes it imperative that a sled's strength shall be so proportioned to its load that danger of breakage will be minimized.

But frangibility of materials is not so important a factor in causing sled accidents as is intemperate loading. The gravest and most frequent mistakes of inexperienced sled travelers are those of burdening a sled beyond its reasonable capacity. A load of a thousand pounds, or of eight hundred, or even six, is so heavy that in going down over a hill or pressure ridge one man finds it impossible and two or three men difficult to control it. The result is that sooner or later the sled bunts its nose or batters its side with too much force against a snag of ice, and we have a breakdown that furnishes interesting material for a forthcoming narrative but constitutes an exceedingly disagreeable experience at the time it happens. It seems to the writer that in practice a load of four hundred or five hundred pounds is as heavy a one as should ordinarily be taken into unknown ice or among mountains, while six hundred is certainly the maximum. One sled tender at each sled can keep the sled going with speed and safety not possible if the load is too heavy.

Another consideration is that the hauling weight of a sled on the level does not increase by any means a hundred pounds for every hundred of its weight. The important thing is to shoe the sleds with material that glides easily over the snow. For all-around purposes it is doubtful if any shoeing excels steel of the greatest hardness compatible with enough flexibility to avoid snapping if the sled runner should bend under a shock. Composition metal, in which copper or nickel is the essential, has much to recommend it, providing the shoeing is at least twice as thick as any the writer has ever seen on arctic sleds, say a sixth to a fourth of an inch at least. The ordinary thin composition shoeing will not go more than two hundred or three hundred miles on salt ice before wearing through and beginning to tear off. If one has Eskimo companions, ice shoeing is perhaps best of all.

Sleds, even with runners of considerable width, will now and then encounter snow so soft that they sink to the body into it. Some attempt to minimize this difficulty by having the body of the sled high from the ground or by increasing the width of the runners. But increased height makes the sled weaker as well as heavier, while increased width of runners increases the surface friction of the sled (especially on salt ice) and makes it difficult to haul. The general plan which the writer wishes to present is this: Have the sled of the height dictated by other conditions than the possibility of deep, soft snow (say eight to twelve inches) and provide for soft snow contingencies by having the bottom of the sled body made of longitudinal slabs of smooth-planed wood bent up slightly at the front end, and have these placed under (not above, as is usual) the crossbars of the sled. Then, when the runners sink into the snow far enough the body of the sled becomes a toboggan—admittedly the ideal form of sled for soft snow. With this provision for heavy going it is safe (in fact, advisable) to make the sled runners narrow if they are shod with metal, say an inch and a quarter as against the four-inch runners of the "approved arctic sleds."

Another word as to sled shoeing: The shore whalers at Point Barrow frequently have to haul boats and other heavy loads over wet sea ice. In their experience no shoeing is so satisfactory as walrus ivory. It is soft and will not last many years on a single sled, but is both lighter-running and more durable than most of the expensive composition metal in use. Shoeing sleds in this fashion is one of the Eskimos' many contributions to the perfect equipment of polar explorers.

In discussing the question of sled construction it is to be said that writers have paid far more attention to it than they have to the more important one of sled dogs. Many books speak of the number of dogs on the ship's deck as if the number and not the individual qualifications of the dogs were the significant thing—as well rate the naval strength of China by the number of her junks or her present military power by her gross population. There is never a horse-dealer who would buy a car-load of horses, unseen, by the number of head, but explorers will place an order for so many dogs delivered at a certain time and place and then stake the success of the expedition on them. As a matter of fact, dogs differ more among themselves than do ordinary horses, almost as much as racehorses differ. Furthermore, deck room on board ship is limited as well as cargo capacity below; every useless dog needs room and eats food; every half-efficient dog eats as much as a sound dog of suitable training. Here, then, we have great waste to begin with; later on, when a sled party leaves the ship the poorer dogs are a grievous handicap, especially in the hands of unskilled drivers, who are often unable to tell whether a dog is really pulling or merely keeping his trace tight and shamming.

As to the type of dog to be preferred the following may be said: The writer has driven half a dozen Greenland dogs, and several dogs from Coronation Gulf, South Victoria Land, West Victoria Land, Bathurst Peninsula, the Mackenzie Delta, Flaxman Island, the Colville River and Point Barrow. These were all dogs secured from Eskimos. In addition he has experience with a dozen or so Indian dogs of his own from the Mackenzie River, and a few dogs of the type known in the central west of Canada as "huskies"—dogs from somewhere near Hudson Bay or from Labrador, which seem to be unrelated to the Eskimo dog proper. In general Eskimo dogs are to be objected to on three grounds: they are too small, they soon cease pulling if hungry, and they are liable to kill each other fighting. Their strong point is a furry coat that enables them to meet the cold well. Of several hundred dogs seen along the Mackenzie River not one in four has a suitable coat; otherwise there are many good dogs among the Dogrib, Slave and Loucheux Indians. On the whole, the best dogs known to the writer are the "huskies." They have a good coat, are large enough (they weigh up to one hundred pounds), have long legs and are therefore fast walkers; they have much stamina and do not (some of them, at least) cease pulling their best till their strength is actually gone—often till they drop and have no energy to follow the sled when the harness has been removed. This last quality is not infrequent among Indian dogs, but I have never seen it among true Eskimo dogs. There is not, however, enough difference in dogs as to geographic origin to justify an expedition taking outside dogs into any district where it can rely on getting a sufficient number of native animals.

It is seldom possible to tell a good dog from a poor one by looking at him; it is not even easy to tell a poor one after you have him hitched to a sled. You see a dog going through the full pantomime of hard work: put your hand on his trace, and he is not pulling ten pounds. That sort of dog is worth no more than his skin is for clothing; he would be expensive if presented to you and a handicap if kept or used.

But how can one avoid such animals? That depends on circumstances. If you are going into a region where you can not get native dogs, and if you are not in the characteristic American fever haste which plans an expedition during holiday week and sends it off in June, if you have the time, you can go yourself or send a man who knows, to buy dogs after testing each one. If you cannot do that. get a man you can trust (if you can get such a man), in some country where dogs are used for hauling, to buy at any necessary price the dogs known in his neighborhood (be it Julianehaab or Nome) as good dogs, not too old, and well furred. (This last is important. Dogs that do well enough at Dawson or on the lower Mackenzie may freeze to death on the coast. Anyway, a dog eats more and is in less flesh if his fur is short or thin.) But if you must buy dogs by the job lot, buy twice as many as you need and have at least one good dog man to try out the whole lot at the first opportunity. Throw out the worthless and even the poor, and grade the good ones into teams, keeping the best for the severest tasks. Do not put good and poor dogs into one team; it is not fair to make a willing dog haul fodder for a laggard team-mate.

If you have good dogs (weighing, let us say, from seventy-five to ninety pounds each), four dogs are enough for a team, and six will haul a larger load than you can expect a sled to stand or one man to take care of in rough going. Each dog should be able to handle one hundred and fifty pounds, though it is a matter of judgment in any given case whether you could not go farther and accomplish more with a smaller load.

The proper number of men on a sled trip is one man for each sled, and one besides to go ahead of the leading team to encourage the dogs on and to pick the road. It is true that every additional man cumbers the party with his food and gear, but if it be not one's object merely to spend the greatest possible number of days away from one's base of supplies, but rather to traverse the greatest distance in a given time, it will be found that, whether the distance covered during the day turns out to be two score miles or two hundred meters (but especially in the latter case), the fourth man with a three-sled party more than pays, in meters or miles, for his board and "keep."

There remains to be considered the matter of harnessing and hitching dogs to the sled. There are three general methods in use.

1. The Greenland or Eastern Eskimo method is to hitch each dog directly to the sled by an individual trace. The traces vary slightly in length, the middle dog (leader) having the longest trace. This method is open to four chief objections.

a. The dogs naturally spread in a fan formation in front of the sled; consequently only a few pull straight ahead, the others pull sideways to a greater or less extent so that (to speak a bit technically) the resultant forward tendency of the sled is at a considerable angle with the strain exerted by any of the dogs (unless it be one or two dogs in the middle of the team). In other words, a good deal of energy is wasted.

b. When the dogs come to a small cake or snag of ice they will split on it frequently, some going on one side, some on the other. This brings the sled with a bunt against the obstruction, or at least catches the traces of the dogs and makes it necessary to stop and get them on the right side of the snag.

c. When the sled stops for any reason (and sometimes even when the sled does not stop) the dogs get tangled in the traces and are often difficult to disentangle.

d. If the dogs come to a ditch-like depression or other obstruction at right angles to one's course, then all the dogs will meet the obstruction simultaneously, and the sled will probably stop. If, however, one of the other two methods mentioned below is used the rear dogs will be on good footing and hauling well, while the front dogs cross the obstruction (be it narrow, as it often is), and the front dogs will in the meantime have secured good footing before the rear dogs get to the bad place where they cannot pull. Besides, dogs side by side are likely to crowd each other where the road is bad, and this will probably start a fight.

The two main points in favor of this system of hitching are (a) that the dogs are freer to travel fast than in any other system (an advantage only when one travels over smooth ice for comparatively short distances) and (b) that the driver can detect, by the slackness of the trace, whether any dog is shirking and can whip the animal up. Those familiar with a dog's ability at bluffing discount this argument somewhat.

2. The white man's (and Indian's) method is to hitch the dogs tandem with two traces running the whole length of the team and fastened to each dog's harness on both sides just behind the collar. This method largely obviates the difficulty of having the dogs pull in other directions than straight ahead and completely obviates the splitting of a team on both sides of an obstruction. It is true, however, that dogs so hitched will not take a light sled over smooth snow nearly as fast as will the same dogs hitched in either of the other two ways. The weightier objection is this: When dogs are pulling where there is very rough ice the leading one or two members of the team may get to an elevation in front while the sled is still on an elevation behind; the result is that the pulling of the leaders lifts the rear dogs almost or quite off their feet—occasionally one sees a dog literally dangling in the air. It is clear that any upward strain on a dog lessens his pulling power by decreasing his purchase on the ground. Furthermore, in rounding a sharp corner of ice the middle and rear members of the team are often jammed against the cake of ice so they cannot pull much, while in coming down off a pressure ridge the rear dog is liable to be injured by having the sled fall on top of him.

3. The Mackenzie River and Western Eskimo method obviates most of the difficulties of both systems and is the one which the writer thinks best suited to rough ice, though he prefers the double-trace system for overland travel. The essential of this method is that there is a single long trace from the sled to the leading dog of the team. At suitable intervals back along this trace are hitched the other dogs, the rear dog say five or six feet from the sled, and the next so far ahead of him that the nose of the dog behind does not quite come to the other's tail. There is a slight difference between the Mackenzie and the Western Eskimo method, which seems to the writer to make the Mackenzie method superior. It is this:

The Western Eskimos generally hitch the dog's harness by a toggle directly to the main trace. When this is done, a dog may be lifted off his feet in rough ice (as described above for the double-trace method). The Mackenzie people get around this difficulty by attaching the rear dogs to the main trace by an individual trace of some length, say four feet for the rear dog. The farther forward in the team you go, the shorter this individual trace. This system gives the dogs almost the freedom of the Greenland method, while in rough ice one dog may be down in a hollow and the other dogs on high places, and still the dog in the hollow has his feet on the ground and is able to pull his best. The individual secondary traces give the same facility as does the fan method for detecting laggards. True, the culprit may be too far ahead in the team for the whip; however, he can be given a place farther back nearer the sled and a more willing rear dog promoted. If properly trained, dogs hitched by this method can, and do, pull as straight ahead as they would in double traces. Only the double-trace method, to be sure, makes pulling straight ahead compulsory even for untrained dogs. As for splitting on obstructions, there is little danger of that, for dogs walking one behind the other will naturally take the same side of the obstruction as does the leader. In going around a corner of ice the dogs can all take, and do take, the side of the trace away from the ice cake and thus avoid being jammed against it.

In addition, mention may be made of an Alaska method of hitching dogs in pairs along a single central trace, each pair pulling side by side like horses. After trying and seeing this method and having seen it tried—if one knows the others—one soon sees that it has most of the disadvantages of all the other three systems and has little to recommend it. That it is used at all is probably due to the conservatism of men used to driving horses in pairs.

In spite of the fact that most of the best arctic journeys have been done with dogs hitched in the Greenland or fan style, the writer thinks it certain that better results could have been gained with the Mackenzie system. There are many explorers of great experience and achievement who have never tried but one method of driving dogs; the writer has tried the above three methods and has besides spent a year or more in each of different regions that knows only one of the three ways. He feels, therefore, entitled to dissenting courteously but definitely from those who prefer the Greenland method.

Langton Bay, Arctic Ocean, December, 1910.

CHINA IN DISTRESS

BY

LIEUT. CHARLES F. GAMMON*

We know so little of China and the Chinese, yet have grown so unconsciously familiar with the stupendous calamities which from time to time afflict that great country, that only the intermittent alarm of frequent famine stories brings to us a real sense of the horrors, the sufferings and death, in the great flood-stricken area of China; horrors not alone of mere starvation, but of that stalking, ghastly "famine fever" we call typhus and the raging small-pox which has already laid its black hand upon many of the impoverished, starving multitudes.

In a period of 1,000 years China has had over 800 famines, yet practically all of these have been unknown to the world at large. The great famine of 1878, taking its terrible toll of nine to thirteen million lives, aroused the attention and sympathy of the whole world, and the generous response which followed the appeal of a Famine Committee at that time did much to break down the barriers of anti-foreign feeling which up to then had been insurmountable.

It is difficult for us to realize the real horror of these extensive famines, confined almost wholly to China, India and Russia. Under the best conditions the Chinese live but a sordid life, devoid of many things we would regard as necessary to existence and with every form of luxury unknown,—for what the Chinese know as prosperity, we should regard as the severest hardship, as it means a coarse and meager living, a cramped and cheerless hut, and the most trying toil from the rising of the sun until the fall of darkness. Milk and butter are practically unknown, meat is rarely tasted oftener than once a week, and then only under prosperous conditions, and in the fat years, there is little surplus to be saved for the lean years of famine. Hence, when drought or flood destroy the crops, there is nothing for the hard-working farmers to fall back upon.

A large family is often divided; part go off as refugees, part stay at home. Those remaining take stock of what they have. They perhaps find sufficient grain for the five "mouths" that are left for four months if they eat but a small quantity, but the farmer knows that now the *four* months' supply must last them *seven* months, and, therefore, they immediately begin to make their food thin, that is, they eat gruel instead of dry bread. Thus tens of thousands live through the famine who otherwise must die. This gruel gets thinner and thinner and contains more and more weeds and leaves and greens, or even roots where they can be found, and less and less of grain. Every resource is used to obtain edible herbs, and everything not poisonous is put into the pot to help fill up. There is, however, little in these things to sustain life, and the bodies of the suffering family grow thinner and thinner until finally their stomachs and faces become bloated and distorted from the unhealthy elements on which they vainly strive to retain a spark of life.

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*Lieutenant Gammon has spent seventeen years in China.

In the case of a man of means, he sells first his cow, the water buffalo that plows his fields, then his farm utensils, and finally his household goods. One by one all are "eaten up," as he would say. Then the doors and windows are taken from the mud-brick hut and carried to market, and at last the few timbers that support the roof go to nourish the family. Left at last without a roof, they join the endless procession of refugees, some to drop and die where they fall, and others to struggle and stagger onward, in the hope of reaching some more prosperous region. Often they gather together into huge camps, huddled into tiny huts hardly larger than a half-barrel, cut endwise, and made of cheap matting, and in these camps pestilence soon finds its way, often in the form of relapsing fever, frequently the deadly typhus, and also in the dread small-pox which soon ends the misery of hundreds in these horrible groups.

These are the conditions existing to-day over an immense area of China. It is the result of three lean years followed by excessive rains and floods, with terrific typhoons, during all last summer, which wiped out whole towns and villages from the map and turned the roads into bogs.

Mr. Jameson, the Red Cross engineer in the field, writes of processions of gaunt, starving people wandering aimlessly, hopelessly along the roads, and falling and dying in the mud when they can go no further. Day after day he passed dead bodies of men, women and children lying where they had fallen. Famine conditions are indeed so desperate and terrible, so beyond the power of imagination to picture, that the descriptions received from different regions seem incredible. With every day these conditions become more acute and must so continue until harvest. The bark has been eaten from trees, roots have been dug and devoured, and even cannibalism is resorted to in the mad craze and unbearable gnawings of starvation.

The recent state of civil war greatly increased the distress caused by failure of crops and destruction wrought by floods, and the unsettled political conditions, still persisting, make it impossible for the new government to do much in aid of the sufferers. For this reason it becomes imperative that the United States, always China's friend, should come generously to the front with help. The remarkable patience of the Chinese under suffering makes relief comparatively easy, if only the means are supplied.

The present famine affects an area of over 50,000 square miles and a population of over 3,000,000 people. Past experience has rendered possible the distribution of famine relief on a most systematic and economical basis. The pauperizing effect resulting to some extent from relief operations in other famines, due to affording support to thousands during prolonged periods of enforced idleness, has been practically eliminated in this.

The famine fund is being largely used in employing the famine sufferers to reconstruct their own dykes and roads destroyed by the floods. Thus the idle and despairing people are enabled to earn a living while waiting for another harvest, and are at the same time helping to restore normal conditions and to prevent future occurrences of this nature. Wages are paid in food only, and this reward is necessarily so limited as to offer inducements only to those truly deserving. To save and sustain life is the object of famine relief, and since the means never equal the need, the rations must be carefully distributed, and those who are suffering least, ignored for those whose necessities are vital. These extreme cases make no demonstration—they have gotten beyond that. They do not even beg, but are mute and motionless, the spark of life hardly struggling to retain its hold upon their emaciated forms. Sometimes when they understand that the ticket given them means food and life, tears roll down their cheeks. Tickets for food are given only in the home, except in exchange for labor, the necessities of each family being judged, not by the home, but by the faces of its inmates. A man may be hungry and suffering for food, but unless his face is swollen from anemia he must be passed by for those more terribly needy. Were it not that through centuries of poverty and extreme hardship only the strong have survived, half the 3,000,000 now suffering would have died in the first months of the famine.

So prompt and systematic were the plans formed by the committee in Shanghai that nearly all of the 3,000,000 starving ones might be saved, if but the tender impulse of charity were to touch the hearts of a sufficient number of people in this prosperous land. Each day the cable, with lightning-like rapidity, conveys the dollars sent to the Committee in New York direct to the Committee in Shanghai. Thousands of the helpless ones are by this means given work to do and food to sustain them, and, with the experience gained in famines of the past, the loss of money in administration and all unnecessary expenses are eliminated. Certainly nothing can more appeal to the human heart than the knowledge of starvation, and as the extent of this great famine is becoming better known, so the response becomes more general.

The New York China Famine Relief Committee, composed of representative men, is co-operating with the Red Cross and all money received is promptly cabled to the Committee in Shanghai, without deduction. Thus far, through this channel and others, over $175,000 has been sent, a sum which is accomplishing great good but one totally inadequate to meet the terrible need.

The Relief Committee appeals to all, even those who can afford to give but little, reminding them that every little will help swell the fund. One dollar will save the life of a man, women or child for a month; three dollars will preserve a whole family for a similar period, and there are 600,000 families starving, with no possibility of relief until the summer harvest. Time is an important factor in this crisis; in a few weeks help will be of no avail. The sooner work and food are provided, the easier it will be to restore normal conditions and to stay the epidemic of disease which accompanies starvation.

Remittances may be sent to Mr. Jacob H. Schiff, Treasurer, 1 Madison Avenue, New York.

NUBIA AND THE BERBERINE

Under this title Mr. H. W. Beckett delivered a lecture before the Cairo Scientific Society, last year, which was printed in *The Cairo Scientific Journal* (Vol. 5, No. 59, 1911). He gives much information about that region known to-day as Nubia, a long tract which from the First Cataract at Aswan to Dongola borders the Nile with a fringe of fertile growth. This strip of cultivation varies in breadth from a few meters just south of Aswan, where the granite precludes any but the most meager attempts at tillage, up to two or more kilometers at places further south. In these places the Berberine industriously till the soil that stretches as a level plain westward to the hills which look out over the arid desert.

The word "Nubia" as a name for the country south of the First Cataract is not known to the present inhabitants and is preserved only by modern geographers. It is possible that the name was derived from the word "Nuba," by which appellation the ancestors of the present inhabitants were known.

From very early times the people of Nubia had close relations with ancient Egypt. As early as the first dynasty, or about 4400 B. C., the power of Egypt was predominant up to the First Cataract, and slowly its domination was extended until, in the sixth dynasty, Pepi I had such control over the tribes of northern Nubia that they were compelled to supply troops for his armies. Mr. Beckett devotes much space to a review of the history of Nubia and its relations with Egypt.

The people call themselves Barabra, and there is still much speculation as to their origin. Some authorities, like Lepsius, maintain that they are a negro race but mingled with an Hamitic strain. Sergi, on the other hand, holds that they cannot be a mixed race and asserts that they preserve the true primitive Nubian type, and are of Hamitic origin. They call their language Nuba, and besides the parent language there are four dialects of it spoken between the First and Fourth Cataracts.

They are of medium size and well proportioned, shorter than the Egyptians, and have black, wavy hair, never woolly. Most of the men, some time or other, visit Egypt and enter domestic service there or go even further afield. They are great travelers, quickly acquire a foreign language and often take on a veneer of civilization. It is a curious fact that the women are as conservative in their habits as the men are the reverse. The women are rarely met outside their native country and cling with tenacity to their old customs. Most of the men know Arabic, but few of the women understand more than a few Arabic words. In their limited Arabic vocabulary the word "backsheesh" holds an honored place, though Mr. Beckett says he was seldom pestered for backsheesh except at places where tourist steamers touch.

Agriculture is the principal occupation of the people, and the way of life of the people is simple, like that of the Egyptian fellahin. Every foot of available soil near a village is cultivated and one pities the people when he considers that though they will be able to carry on their cultivation in future, yet during a large part of the year the reservoir above the Aswan Dam will be full up to the level of 113 meters above the sea, so that all their land will be completely submerged. Egypt's gain will be Nubia's loss. Many of the villages will have to be removed to higher ground at a greater distance from the present stream. The Government has promised to pay the people for every building or palm tree submerged, and Mr. Beckett found individuals busily engaged in erecting houses in the direct path of the future inundation with the fond idea of recouping themselves at government expense, with good interest on the outlay.

Burckhardt, who traveled in Nubia early in the 19th century, made the remarkable statement that the size and figure of the people were usually proportionate to the extent of the cultivable soil. "Where the plain is large and the people can cultivate to an appreciable extent, and are in comparatively favorable circumstances, they are tall, muscular and healthy; but where, on the contrary, the plain does not amount to more than twenty or thirty meters in extent they have small figures" (!).

As most of the younger men are in service in Egypt and only return to their villages at intervals, it is generally the older men and the women and children who live in the villages and tend the crops. A large amount of money is sent back to Nubia as the result of the money-earning abilities of the men who go to Egypt for work. It is said that as much as $200,000 a year finds its way up the Nile from Egypt to the villages lying between Aswan and Dakka, so that domestic service in Egypt has its compensations for the people who remain at home.

Their manufactures are few, and consist chiefly in the production of handmade pottery, mats and baskets made from the leaves of the date palm, and coarse woolen and cotton cloth woven on a rough loom, which the women use to make their garments, though most of the men buy their clothing in Egypt. Their villages consist of mud-built houses, erected generally on the desert side of the cultivated land, their distance from the river varying with the breadth of the cultivated area. Often the houses, clustered close together, are perched on the rocks or high ground overlooking the fields and the river. Some houses have outside staircases leading up to the roof. The mosques are the most pretentious buildings.

The interior of the houses is beautifully clean and neat and is thus in marked contrast to the dwellings of the Egyptian fellahin and the poorer classes in Egyptian towns, which are almost invariably filthy. The floor covered with clean sand, the household pots and pans hanging from the ceiling shining and polished, and the absence of refuse and of the unpleasant smells which proclaim the proximity of an

Egyptian village all testify to the love of cleanliness of these people, who in their own homes, whatever they may be in Cairo, are a scrupulously clean race.

"As with all Mohammedan peoples, so with the Barabra, hospitality is a very common virtue and even becomes at times somewhat embarrassing. Tea appears to be greatly prized as a luxury among them and is pressed upon the guest, very often served, sad to relate, in cups ornamented with the name of some hotel, accompanied by spoons the crests or initials on which point to their having been brought away from Egypt as souvenirs of service."

It would be hard to picture a more healthful race, for disease is rare among them, except ophthalmia, which is fairly prevalent, though not so widely as in Egypt, and rheumatoid arthritis, which is almost universal. This disease is probably due to the constant immersion of the limbs in water, such as one would naturally expect from people engaged all their lives in agricultural pursuits necessitating the constant use of water for irrigation. The women seemed to be incessantly carrying their water pots to and from the river.

The scenery of Nubia has a charm peculiarly its own. Narrow though the strip is, it makes a belt of green between the desert and the river . . . There are here and there spots of real beauty. Occasionally the scenery is rugged and steep rocks rise almost clear from the water's edge; but ordinarily the banks are low and covered with castor-oil plant, lubia, and sunt trees, while the dom and date palms are scattered here and there, and in the background are clusters of mud houses that mark the sites of villages. At Dakka, where the houses are close to the water's edge, the view of the town from the river is extremely picturesque. This is one of the prettiest spots along this part of the Nile.

ISOSTASY AND MOUNTAIN RANGES*

BY

HARRY FIELDING REID

The cause of the elevation of mountains has always been a most fascinating subject of study, and we find the earlier geologists giving much attention to it. In the first half of the nineteenth century the prevailing idea was that mountain ranges were due to the upward pressure of liquid lava and that their elevation was closely related to the volcanic forces. As late as the middle of the century Elie de Beaumont upheld this idea with all the prestige of his great authority.

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* The BULLETIN is permitted, through the courtesy of the American Philosophical Society of Philadelphia, to reprint this paper from its *Proceedings*. The paper was read before the Society on April 21, 1911, and appeared in the *Proceedings* in Vol. 50, 1911, pp. 444–452.

But a more detailed study of the structure of the rocks which make up the mountains led to different conceptions. It was found that the whole mass had been subjected to tremendous compressional forces in a line at right angles to the mountain range. This was shown by the immense folding of the rocks, the existence of thrust faults and of cleavage and the evident flattening out of fossils; so that the existence of these tangential forces was thoroughly proven. This led then to the idea that mountains owe their origin not to vertical forces, but to the great tangential forces which folded the rock and squeezed it upwards. Professors Heim and Suess in Europe, and Dana, Hall and Le Conte in America, were all very active in developing this point of view, though Dana realized that vertical forces also played some part in the elevation of mountains; but the dominant influence of the tangential forces was recognized in the name *orogenic*, or *mountain-making* forces, which was reserved entirely for them. Without doubt, confidence in the efficiency of tangential forces was greatly strengthened by the fact that these forces could be satisfactorily accounted for by the cooling of the earth; for the cooling is greatest at a short distance below the surface and the exterior layers are subjected to tangential crushing to accommodate themselves to the shrinking interior.

There are great areas of the earth, such as the high plateau regions in the west of the United States, where the rock has been elevated many thousands of feet but without suffering any compression whatever, which makes it quite evident that there are vertical forces which produce many movements in the earth's crust. Mr. Gilbert has given to these forces the name of *epeirogenic*, or *continent-making* forces, to distinguish them from orogenic forces; but we must not forget that epeirogenic forces are apparently alone active in the elevation of certain mountain ranges. The Sierra Nevada, for instance, although its strata are much folded, owes its present elevation to the vertical forces which seem still to be tilting the great block. Mt. St. Elias also seems to have been tilted up by vertical forces without any folding of its strata.

The American geologists showed that a mountain range does not rise haphazard in any part of the earth, but that it appears where there was earlier a great geosynclinal, which had gradually subsided and accumulated sediments to an extraordinary thickness, all of them being laid down in comparatively shallow waters; and it was only after this preparatory step that the foldings and elevation of the mountain range took place.

But there is one important factor to which geologists have not given proper attention, that is the revelations of the plumb-line. About the middle of the nineteenth century Archdeacon Pratt pointed out that in the south of India the plumb-line was deflected toward the Indian Ocean, and in the north of India, although it was deflected somewhat toward the Himalaya mountains, still the gravitational attraction of these mountains was considerably less than it should have been, if the density of the material in and under them had been the same as in other parts of the earth's crust; and he, therefore, suggested that the oceans were deep because the material under them was heavy, and the mountains were high because the material which composed them was light, and that in general the amount of material under any two equal segments of the earth was the same. But these facts did not make a great impression upon geologists and did not prevent the further advocacy of compression and the consequent accumulation of material as the cause of mountain elevation.

In 1880 Mr. Faye showed that the so-called "anomalies" of gravity would practically disappear if, in reducing observations on land to sea-level, no account were taken of the land mass above sea-level; and if, in reducing observations made on islands in mid ocean, the excess of attraction of the island mass over an equal amount of sea-water were subtracted. This is equivalent to assuming that the continental areas stand up on account of their low densities, but that the small islands are supported by the rigidity of the crust.*

In 1889 Major Dutton read a very remarkable paper before the Philosophical Society of Washington,† in which he pointed out that the mountain regions were probably continuing to rise as a result of the lightening of their weight by erosional transportation and that regions of deposition near the coasts were probably sinking on account of the added material which they were receiving, and that the forces thus brought into play would set up slow currents from the regions under the sea towards the region under the mountains; and he held that the earth was not strong enough to sustain the weight of great mountain ranges but that these owed their elevation to the fact, as already suggested by Archdeacon Pratt, that they were lighter than the material under the lowlands, or under the oceans; and that there was, therefore, a certain equality of weight in the various segments of the earth. He gave to this theory the name of *isostasy,* which has served to give it definiteness ever since. It is to be noticed that Major Dutton considered the elevation of mountains to be due to vertical, and not to tangential forces.

The theory of isostasy has been much discussed by geologists since Major Dutton's paper; many papers have been written on the subject, and the available geological evidence has been invoked in support of, or against, the idea; but it was not until very recently that the real evidence which lies in the variations of the force of gravity and the deviation of the vertical, has led to definite conclusions.

Mr. Putnam and Mr. Gilbert‡ discussed a series of gravity observations made across the United States, which led them to the conclusion that isostasy was true only in so far as the very largest features of the earth's crust, such as the continents and ocean basins, were concerned, but that mountain ranges were at least in part supported by the rigidity of the crust.

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* "Sur la reduction des observations du pendule au niveau de la mer," *C. R. de l'Acad. des Sciences*, 1880, Vol. 90, pp. 1443–1447.

† "Some of the Greater Problems of Physical Geology," *Bull. Philos. Soc. of Washington*, 1889, Vol. XI, pp. 51–64.

‡ "Results of a Trans-Continental Series of Gravity Measures," *Bull. Philos. Soc. of Washington*, 1895, Vol. XIII, pp. 31–76.

When Dr. Nansen drifted across the North Polar basin in the *Fram* he provided pendulums to determine the force of gravity when the ship was frozen in ice; and the discussion of his observations showed that gravity was normal over that basin, or, at least, where his observations were made.*

Professor Helmert,† in Germany, has done much in the discussion of gravity measures and Dr. Hecker has made some notable voyages and has determined the forces of gravity at sea, over the Atlantic, Indian and Pacific oceans, and over the Black Sea, the results showing that on the whole the force of gravity is normal over these bodies; only in special and limited areas, in the neighborhood of very steep slopes, was any marked anomaly found.‡

But the most important work which has been done along this line is the work of Dr. John F. Hayford,§ who, while connected with the United States Coast and Geodetic Survey, discussed in a thorough and able manner the deflections of the vertical at a large number of stations in different parts of the United States, and his results show definitely that over this region isostatic equilibrium actually exists. He has concluded that this is true even for areas as small as a square degree, that is, seventy miles on the side. He believed that the earth is not strong enough to sustain an added thickness of more than about two hundred and fifty feet of rock over an area as large as a square degree without slowly yielding. The stations where the observations were made are scattered over various parts of this country, on the eastern coast, in the Appalachian mountain range, in the region of the Great Lakes, near the Gulf of Mexico, in the great plains of the Mississippi basin, on the great elevations of the Rocky Mountains, the plateaux of Utah, the Sierra Nevada mountains and the Pacific coast, regions exhibiting a great variety of topographic forms and differing greatly as to geologic activity. Whatever movements may be going on in the Rocky Mountains, and in the region between them and the Atlantic Ocean, are certainly very small; whereas to the west, and particularly in the State of California, the movements seem to be very active. The eastern edge of the Sierra Nevada received additional elevation at the time of the Owens Valley earthquake in 1872, and the comparatively frequent earthquakes in the Sierras and the Coast ranges make it quite possible that these mountains are now being elevated as actively as at any time in their history. In view of the great variety of the country in which the stations were located, both as to topography and geologic activity, in view of the great amount of material being continually eroded from one region and deposited in another, thus tending to overthrow the isostatic equilibrium, and in view of observations in other parts of the world, we are driven, with Dr. Hayford, to the conclusion that isostasy is not an accidental condition existing at the present time within this country, but is due to the fact that the earth yields plastically to the long-continued action of even small forces. We feel justified, therefore, in believing that isostatic equilibrium exists in other parts of the world and existed in other geologic ages, and in saying that the whole earth is, and always has been, in isostatic equilibrium.

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* "The Norwegian North Polar Expedition of 1893–96," Vol. II, Part VIII, Results of the Pendulum Observations, by O. E. Schiölz.

† "Höhere Geodesie," Leipzig, 1880.

‡ "Bestimmung der Schwerkraft auf dem Atlantischen Ozean," *Veröff. des König. Preuss. Geodet. Instit.*, Neue Folge, No. 11. "Bestimmung der Schwerkraft auf dem Indischen und Groszen Ozean, *Veröff. des Zentral Bureaus der Internat. Erdmessung*, Neue Folge, No. 18. "Bestimmung der Schwerkraft auf dem Schwarzen Meere," same, No. 20

§ "The Geodetic Evidence of Isostasy, etc.," *Proc. Washington Acad. Sci.*, 1906, Vol. VIII, pp. 25–40. "The Earth a Failing Structure," *Bull. Philos. Soc.*, Washington, 1907, Vol. XV, pp. 57–74. "The Figure of the Earth and Isostasy," United States Coast and Geodetic Survey, 1909. "Supplementary Investigation in 1909 on the Figure of the Earth and Isostasy," same, 1910. "The Relation of Isostasy to Geodesy, Geophysics and Geology," *Science*, February 10, 1911.

This conclusion carries with it many important consequences and has a very direct bearing on the theories of the origin of mountain ranges; for it tells us that every segment of the earth, having an equal area of surface and with its apex at the center, contains the same amount of material, which it is impossible either to increase or decrease. If by erosional transportation a large quantity of material is removed from a high land and deposited in the oceans, then the increase of weight under the ocean and the decrease under the mountains will, as Major Dutton explained, set up a subterranean counter flow, which will restore the equality of material in the segments. If by the exercise of tangential forces a portion of the earth's crust is compressed and folded and the quantity of material in the segment thus increased, the added weight will cause a slow sinking of the region and material will flow out from below and reduce the mass of the segment to its proper value. Indeed, the folding up of the rock by tangential pressure would not elevate a mountain range, but would cause the folded region to sink; not, however, necessarily below its former level.

When we consider the origin of the mountain ranges, the theory of isostasy requires that all hypotheses, which call for more than the normal amount of material in any segment, be excluded. The folding of rock under tangential forces, and the increase of material by subterranean flow are necessarily debarred. Dana noticed that the great mountain ranges of the world were opposite the great oceans and, in some cases, were opposite the great depths of the oceans. The inference was natural that material was taken from the ocean bed, increasing its depth, and added to the land, increasing its height; but the theory of isostasy forbids this inference. He also suggested that the segments of the earth forming the oceans were sinking more rapidly, as the earth cooled, than the segments forming the continents, and also that they were stronger; so that they compressed the continents, folding the rock and making mountain ranges around their borders. Besides other objections to this idea, the theory of isostasy excludes it on account of the increased material required in the land segment. Professor Charles Davison* has suggested that the oceans owe their existence to the stretching and consequent thinning of the strata below them, but the theory of isostasy does not permit the withdrawal of material from the ocean bottoms. Sir George Darwin† has suggested that the continental areas of the earth may be due to elevations caused by the differential retarding effect of lunar tidal action. But the theory of isostasy tells us that they could not have maintained themselves unless they were especially light; and in this case they would have existed independently of the tidal forces. Although these elevations, or "wrinkles," as Sir George Darwin calls them, might have been distorted by the different tidal effects in different latitudes, their original meridional direction still requires explanation.

The foldings and contortions of the rock have been so intimately associated, in the minds of geologists, with mountain ranges, that a low-lying region of folded rock has been looked upon as the remains of a mountain range removed by erosion; but as mountains are not due to rock folding, this inference may be entirely wrong.

Only a few of the consequences of the theory of isostasy have been mentioned; but the principle is of such fundamental importance that it will surely exercise a strong influence over our future theories, and will be applicable in directions not now suspected. Unfortunately, it does not tell us definitely what is the cause of the elevation of mountains and plateaux; but it limits our inquiries by excluding all theories which assume the addition of matter to a segment. It tells us, quite definitely, that the elevation of mountains, or the depression of the oceans, must be due to vertical forces brought about by a decrease or increase, in the density of the material under these regions. According to it, the mountains are high because their material is light; and as geological history tells us that the mountains have not always existed, we must conclude that they were elevated by an expansion of the material in and under them. And the great deeps of the oceans are deep because the material under them is dense and they have become deep by an increase in the density of this material. Since all mountain areas are being lowered by active erosion and many of the great ocean deeps are being filled by depositions, the great heights of the former must be due to the fact that they are still in the process of elevation or that they have only recently been raised; and the great depths of the latter to the fact that they are in the act of sinking, or have only recently sunk. As the centres of the great majority of strong earthquakes are along the boundaries of high mountain ranges, or of great ocean deeps, it seems most probable that the forces which have produced these very interesting features of the earth's surface are still in active operation.

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* "On the Distribution of Strain in the Earth's Crust resulting from Secular Cooling, with special reference to the Growth of Continents and the Formation of Mountain Chains," *Phil. Trans. R. S.*, 1887, Vol. 178 (A), pp. 231–242.

† "Problems connected with the Tides of a Viscous Spheroid," *Phil. Trans. R. S.*, 1879, Vol. 170, p. 589.

FARMERS OF FORTY CENTURIES*

A REVIEW

In occidental lands the population grows denser by the growth of villages, towns and cities. Exception has to be made of new, frontier regions, like the Canadian Northwest, where there is a good deal of growth by the taking up of new lands. But new lands are becoming scarce in the world, and manufacturing industry, which is town or village business, has so developed in the last century that in the United States nearly half the people are now living in centers of over 2,500 inhabitants. If all centers be counted, less than 2,500 as well as more, much more than half of us would be found living in them. In Europe the proportion may be still larger. The greater the population density, the more pronounced this preponderance of city life. In our South, 15 to 30 per cent. of the people live in centers of 2,500 or more people, in the southern Great Lake country 50 per cent., and in New England over 75.

Thus is it that in occidental lands population densities of over 250 to the square mile attest manufacturing as a main occupation of the people, and this mainly in cities of considerable size. Europe has some 200,000 square miles of this density, including the ninety largest of its 150 cities of over 100,000 people. This belt of very dense population stretches from the English Midlands to Poland, and is the seat of the continent's greatest manufacturing activity. In China with a population not so much less than Europe's, there is three times as much territory with 250 people to the square mile, yet it contains but twenty-five cities of more than 100,000 people. In the Orient a very dense population is not incompatible with country life, for agriculture is still the preponderant occupation, but it is an agriculture of an intensity unknown with us.

Of this intensity of Oriental farming, and the great density of their population, Professor King knew nothing in 1905. He was interested merely in the long continuity of their farming processes; he had great respect for the knowledge which so-called ignorant farmers in this country had acquired by experience long before it was explained by scientists, and desired to learn what the far longer experience of the East had taught the farmers there, especially in matters of soil management, on which he had long been at work. Thus he was in a receptive mood, but he was "surprised and amazed."

The crowding of the people is intense, hence the motive of high cultivation. An acre of good land (p. 193) is ample to maintain six persons in China and three in the southernmost islands of Japan; that means 3,840 and 1,920 people to the mile, but it makes no allowance for mountain and waste lands, which in Japan make up five-sixths of the territory. The cities, however, have still to be counted in. In their neighborhood the densities will be above the figures given. Extensive areas within the cities of Chicago and New York are less densely settled. In favorable regions in Shantung the country dwellers average 1,536 to the square mile (p. 233). On the largest plain of Japan, that of Tokyo, measuring 2,700 square miles, the average is 2,645 people to the mile (p. 419). King found the overcrowding in Japan visible to the eye (p. 23), the cities with houses, the houses with people or wares, the country with fields and the fields with crops. It is this dense population, through the long period of their occupation of their land, that has taught them that painstaking practice of agriculture which attracted the western scientists.

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* Farmers of Forty Centuries or Permanent Agriculture in China, Korea and Japan. By F. H. King. ix and 441 pp. Maps, ills., index. Mrs. F. H. King, Madison, Wis. 1911. $2.50. 8 x 6.

Their overcrowding has been recently described as condemning the whole people to misery and wretchedness. There is no mention of this view in Professor King's book, but he did not see things so. He found them contented and happy. In Japan strong men and contented, with their faces often wreathed in smiles (p. 19). At Moji, Japan, his steamer was coaled by long lines of men and women with baskets. Aboard the vessel a woman empties them, while her two-year-old baby sways in the sling on her back (p. 42). "The mother looked strong, was apparently accepting her lot as a matter of course, and often, with a smile, turned her face to the child who patted it and played with her ears and hair."

In China, everywhere, the laboring people who were occupied were contented. Idlers or vagrants hardly existed away from the places where tourists encourage them. There can be no doubt that the laboring classes perform a vastly greater aggregate of steady individual toil than with us. Old men and women continue their labors at an age when we should want them spared. Yet all these people exemplify a thrift unknown among us. Servants sent to make a purchase get some equivalent if the price of the article sought is a trifle high and decline to use an American stove as it wastes so much fuel, making too big a fire.

The Chinese at Shanghai were large men, quite equal in frame to large Americans but quite without superfluous flesh, yet few were underfed. Beside the crowding of the people, they have to contend with a heavy burden of taxes. In China it is not unknown for these to be levied a second and even a third time in the same year (p. 331). In Japan the taxes in 1907 amounted to $2.60 per capita, nearly $9 per acre of cultivated land, and $23 for each household in the empire.

The yields secured from the soil are large and by a careful succession of crops the ground is kept at work all the time. A light sandy loam in Manchuria yielded, in a year, first twelve bushels of wheat to the acre, then twenty-one bushels of millet, and later twenty-five bushels of soy beans, all measured to the acre and on the same ground. A gardener near Nagasaki grows three crops of rice, puts $60 worth of fertilizer on it and gets a return of $250 per acre. Another Japanese farmer is represented as getting a hundred dollars' worth of crop from less than a tenth of an acre of ground. They crowd their plants as they are crowded. The very hens in Japan number over 800 to the square mile of cultivated land (p. 180), more than twice as numerous as with us.

"The important point regarding these Far East people to which attention should be directed, is that effective thinking, clear and strong, prevails among the farmers who have fed and are still feeding the dense population from the products of their limited areas" (p. 207). The sympathy and admiration of that paragraph are typical of Professor King's book. It was the farming classes he sought to meet. He could not talk to them. Interpreters were often not to be had, but he made himself known, guiding their plows, watching their processes and exchanging smiles with quickly made friends.

In ever present hot water for making tea—characteristically kept in fireless cookers—he is sure he sees (p. 77) a preventive measure against typhoid fever, almost inevitable in lands of so dense a population. Apparently, the careful analysis of waters in Manchuria by Japanese medical scouts was not purely an adoption of Western science but in part a refinement of instinctive Oriental practices. As "fundamental sanitary practice" he notes the rarity of flies and attributes it to the scrupulous saving of hoursehold wastes (pp. 78, 202).

Chinese mechanical appliances are of a high order of efficiency and simplicity, As an instance might be mentioned their foot-driven irrigation pumps, similar to our chain pumps, but with large wooden blades where they have widened members of a chain, working in an open inclined trough instead of a tube. Their merit consists not merely in their ability to lift seven and a half acre feet of water in ten hours for forty-five cents, gold, but also in their simple construction and easy application to field, ditch and ever-ready man-power. Shall we introduce modern power appliances into China? Apparently they have something more efficient. Where can steam compete with stern-wheel boats driven by rows of men treading around an axis, if this apparatus can carry passengers at a fifteenth of a cent a mile? If efficiency and adaptation are criteria, King saw Western machinery outmatched at every turn. Near Sungkiang he saw a railroad bridge built on the ground in a field (p. 299). When it was completed water was turned under it and compelled to make itself a new channel and the old one was filled in. The Japanese simplified their water-lifting apparatus into a mere wheel in the ditch. A man trod the paddles on the water side, making those on the land side lift water to the field (p. 302). On a Chinese river the current did the lifting.

Of road building the Chinese have done little apart from the imperial courier routes. They have taken the more direct course of developing the vehicle. Their wheelbarrow is represented as the most efficient vehicle imaginable for good roads or bad, with a broad tire on a large wheel in the midst of the load, not, as with us, at one end of it. The carrier takes what little strain rests on the handles on a broad shoulder strap and carries four, six or eight passengers at once or an equivalent load of merchandise. An animal may be harnessed or a sail spread to help. Where we have sought the worker's ease while he worked as an end they have set their vision purely on getting the maximum result from the minimum of outlay. Human effort is merely one of the forces they employ. They assume it will continue to be exerted. At Nanking a Chinaman is seen bricquetting charcoal powder moistened with syrup waste, adding tiny pinches to a mold and giving repeated blows with a heavy hammer. The principle used is the same utilized here in the most modern hay and cotton presses of repeated small charges (p. 139), giving a much denser bale than is otherwise possible. Always the mechanism is reduced to the lowest possible terms "the principle put to work almost unclothed" (p. 363). So their vertical turbines and horizontal axis wind-mills for pumping salt water about Tientsin (p. 335). Highly scientific incubation of hens' eggs and those of ducks and geese is carried on in China in wicker covered jars containing 1,200 eggs each and the charcoal heater. A single room visited in Shanghai (?) contained thirty of these incubators. Sterile eggs are quickly detected and put on sale before they have spoiled as food. At the incubators, eggs are bought at six cents for thirteen; seven of the chicks, when ready to feed, for nine cents, almost every family in city or country village buying and keeping a few. The building scaffoldings of lashed poles, allowing adjustment to any height and indefinite reuse are of course familiar in Europe and a result of scarce lumber.

King gives the Chinese nitre-farmer credit for a good understanding of nitrification and suggests that our forbears, who left us such a phrase as "mother of nitre" did not do it without a perception of a vital factor active here even if they had never seen bacteria with a microscope. It is interesting to see a scientist of King's standing so prompt to recognize the science embodied in Oriental farm practice. But he went East prepared to do this. Watching a Chinaman fit soil with a hoe for half an hour, he notes that angle worms abound and admires to see the hoe neither harm a single worm nor leave one uncovered (p. 205). "While we could not talk with him, we were convinced that his action was continually guarded against injury to the worms." He felt that the man acted as if he knew the value of the worms as well as he. He found their farm implements not crude but admirably adapted to their circumstances. Even our plows would be impossible there. Coal shipped in open cars was sprinkled with whitewash, making theft self-revealing; other bulk commodities similarly. The Chinese Wall was not only completely efficient in its day, but its $520,000,000 of cost very small in comparison with the national defenses of European nations. The steep ridging of the fields makes rain penetrate quickly, letting the air out above that the water may enter below. The effective use of human excreta and garbage in fertilizing, the thoroughness with which it is composted and applied to the soil to balance the heavy drain of the close succession of crops is made very clear in every detail. Great cities in China and Japan need no hydraulic sewerage system. Canton, on the contrary, receives yearly $31,000 in gold from a contractor for the privilege of removing all house waste. At Kobe, Japan, such waste is sold for from 54 cents to $1.63 per ton. Japan applied a ton and three quarters to each acre of her fields in 1908. The chemical contents involved are everywhere worked out in detail. Europe and America are estimated to throw into the sea annually the equivalent of over a million tons of phosphate rock.

With us in the West, as has been said, increased population means more of city life and the conditions of city life do not seem satisfactory, for it is there that misery and crime most abound. That this life is attractive to the country dweller is evident from his widespread movement toward the town, perceptible too in the Orient, but in a very much less degree. But there is no note in King's work of such misery in the dense agricultural populations of the East. In studying the future possibilities of population in this country we have been told that we do not propose to consider Chinese conditions. Our progress cityward is evidence of a desire to escape from burdens. In this the mass of the city dwellers have failed utterly. The Chinaman and the Japanese have shown us that heavy burdens may be borne with contentment.

On the whole, it is a remarkable glimpse of the East that we have here. These are real observations of a real observer. They convince the reader of their truth and accuracy. The effect of the fairly wonderful photographs is to strengthen this conviction, though they are often poor as photographs and poorly reproduced. Their contribution to the argument is very great. We have been so often told that the Chinese mind is sealed to us that it is refreshing to find a most modern and highly trained American without any inkling of their language or civilization at once at home among them on his own ground.

MARK JEFFERSON.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

A regular meeting of the Society was held on April 23, 1912, at 8.30 P. M., at the Engineering Societies' Building, No. 29 West 39th Street. Councillor Levi Holbrook in the Chair. The following persons recommended by the Council were elected to Fellowship:

George A. Armour,
C. G. Seymour Bagot,
Thomas H. Barber,
Joshua William Beede,
Ernest C. Bliss,
Charles Wilson Brown,
Rudolph E. Brünnow,
George Bryce,
C. L. Carpenter,
Thomas H. Chamberlin,
Frederick G. Clapp,
Jane Perry Cook,
Frank R. Cordley,
Ralph Adams Cram,
Henry Edward Crampton,
Thomas DeWitt Cuyler,
H. Stuart Hotchkiss,
Marion Eppley,
Mrs. E. L. Reaney,
Mrs. Edwards Spencer,
Otto M. Eidlitz,
Hans A. Frasch,
Jacob Hasslacher,
W. Thorn Kissel.

The Chairman then introduced Mr. W. S. C. Russell of Springfield, Mass., who addressed the Society on "Iceland." Lantern views were shown.

THE SOCIETY'S HOUSE TO BE CLOSED IN JULY. The Council decided, at its meeting on April 18, to close the Society's building during the month of July. The house will be reopened on Aug. 1.

AMUNDSEN TO RECEIVE THE DALY MEDAL. The Council on April 18 awarded the Charles P. Daly Medal to Captain Roald Amundsen. The medal bears the following inscription:

"Awarded to Roald Amundsen in recognition of the value of his magnetic observations in the American Arctic, achievement of the Northwest Passage, explorations in the Antarctic, and attainment of the South Pole."

The medal will be presented to the explorer at one of the meetings of the Society during his coming visit to this country.

NORTH AMERICA

FAILED TO SCALE MT. MCKINLEY. The expedition to Mt. McKinley which left Fairbanks, Alaska, on Feb. 5, fitted out by a newspaper of that town to make the ascent of Mt. McKinley, returned unsuccessful on April 10. The party says that it attained an elevation of 10,000 feet on the north side of the mountain east of Peter Glacier. Precipitous ice cliffs prevented further progress. These are apparently the same ice cliffs which defeated F. A. Cook's attempt to ascend the mountain on that side. The party did not have sufficient supplies to attempt the ascent by another route.

NEW MAP OF ROCHESTER. In 1911, the area included in the U. S. Topographic sheet embracing Rochester, N. Y., was resurveyed and the new sheet has just been issued. The resurvey consisted in revising the culture—railroads, wagon roads, houses, etc. Rochester has made growth since the original survey in 1893 and the new sheet shows that the surrounding country is much more thickly settled.

QUARTERNARY DEPOSITS IN COLORADO. The glacial and river deposits in the Breckinridge district near the Continental Divide in Summit County, Colorado, are estimated to have yielded approximately $10,000,000 in placer gold since first operated in 1860. F. L. Ransome has recently described these Quarternary deposits ("Geology and Ore Deposits of the Breckinridge District, Colorado," *Prof. Paper, U. S. Geol. Surv.*, No. 75, 1911, pp. 72-80, 175-181, 183). The glacial deposits are terminal moraines, valley train outwash, lake deposits, hillside wash, and terrace gravels; and there are strips of modern stream alluvium, residual soils, and talus accumulations. Ransome concludes that the terrace gravels and older hillside wash represent an earlier cycle of glaciation which was followed by retreat and by readvance in a later glacial cycle, whose deposits are the moraines and low-level gravels or outwash. There is no morainic material of the first advance, which is thought to have taken place because some of the moraines and valley train gravels occupy valleys cut in the terrace gravels and because the terrace gravels themselves are considerably weathered. L. M.

GLACIERS EAST OF MT. WRANGELL, ALASKA. In connection with the study of the mineral resources of Alaska it is often possible to gather important data on glaciers and glaciation. Many publications of this sort are issued under the direction of A. H. Brooks, and the matter is illustrated once more by a recent U. S. Geological Survey publication, containing a discussion by Moffit and Capps and an excellent map by Witherspoon (Geology and Mineral Resources of the Nizina District, Alaska, *Bull.* 448, U. S. Geol. Survey, 1911, pp. 43-52).

The former extent of glaciation is presented in some detail and shown upon the geological map. An interesting feature is the importation of foreign rocks and pebbles of native copper into valleys containing none of these rocks in place, at the stage when the ice rose 3,000 or 3,500 feet higher than now and overrode high cols. The intensity of glacial erosion at the maximum is shown by steepened valley walls, truncation of spurs, hanging valleys, etc., well described in the text and shown upon the topographic map. The great thickness of outwash gravels, 500-700 feet in places, bears an interesting relationship to glacial stream alluviation and apparently to the barring of mouths of deglaciated tributary valleys by the trunk glaciers. These and many other specific points in connection with the present glaciers and the former glaciation mark the report as one which should be of great use to glacial geologists.

It seems gratuitous to criticise, in a case where the geologist in charge of a division of mineral resources encourages, and the authors undertake so much work outside their special field,—the stratigraphy and the copper and gold deposits. Nevertheless, one cannot help regretting the rigidity of a system of map legends which makes it necessary to map the glacial outwash as "alluvium (gravels, sand, and silts of floodplains)," sharply differentiating it from the outwash in the bench gravels, which is included in "moraines and associated gravels (glacial till and glacio-fluvial bench gravels, sands, and silts)." The geological map, and the cross sections upon it, are open to criticism in this respect, for they set up an artificial, arbitrary boundary, suggesting a sharp change in conditions of deposition, where there has doubtless been a continuous process. Indeed, the map gives no hint that the "alluvium" is of glacial origin, though the text makes the relation of these deposits to the existing glaciers perfectly clear. A minor error is the mapping of the present terminal moraine of Kennicott Glacier, which is made up largely of till, and rises sharply above the glacial floodplain as "alluvium." The suggestion of interglacial epochs, though accompanied by a frank statement that there is no evidence of them, seems unnecessary.

It is to be hoped that future work on economic geology in regions of existing glaciers may result in other reports on glacial geology as praiseworthy as this one. In addition to the report itself, an especially good feature is D. C. Witherspoon's topographic map on the scale of an inch to the mile and with 50-foot contours, including the innovation, at least in United States Geological Survey maps, of blue contours upon the glacier surface. These afford important data upon the slopes of the ice margin and its surface. The contours would be of great value, for example, in the case of Kennicott Glacier, if an advance should break up the slow-moving southern portion, now covered deeply with ablation moraine, for they would enable the accurate measurement of the thickening of the glacier with advance. Or if advance were postponed many years, a resurvey would make it possible to determine accurately the rate of thinning of a moraine-veneered glacier by ablation. It is to be hoped that the contouring of Alaskan glaciers may be continued where possible, and that geologists like Moffit and Capps may be encouraged to continue the observation and publication of glacial data, as in this excellent report. LAWRENCE MARTIN.

THE TANCÍTARO PEAK. Ezequiel Ordoñez, former Assistant Director of the Geological Institute of Mexico, visited, in January, 1910, the Tancítaro Peak, one of the highest mountains in the southwestern part of the Mexican Central Plateau. He published a paper on the mountain in *Memorias y Revista de la Sociedad Científica "Antonio Alzate"* (Sept.-Oct., 1910), from which the following facts are condensed.

The Tancítaro Peak is one of the highest (12,660 feet) in the western part of the Mexican Central Plateau. It lies in the southwestern portion of the district of Uruapan, in the state of Michoacán in 19° 5′ N. Lat., 2°59′ 57″ W. of Mexico City, according to Lejarza.

The mountain can be distinguished from afar owing to its isolation. It rises above the gentle southern slope of the Mesa Central, and is topographically connected with the outlying volcanic ranges by a line of vents of no small importance. The peak is a highly eroded ancient volcano, at the foot of which a malpais region extends in all directions. The district immediately surrounding its base has been overrun by successive lava flows emitted by near-by volcanoes. The crest of the mountain has a general N-S trend. Its southern extremity is visible at a distance owing to its height, the peak rising to 3,860 meters above sea level according to hypsometric calculations. Its northern extremity, slightly less than a kilometer in length, is subdivided into two main branches which, together, assume the form of a horseshoe. It is here that the Víbora cañon originates to end subsequently in the tierra caliente west of Apatzingán. The westernmost of these two branches is the more important and is known to the natives of the district by the names of Piedra del Horno, Piedras Paradas, etc. In the same way other spurs radiate outward from the peak towards the south and, to a lesser degree, to the east and the west. They thus present the appearance of the spokes of a huge wheel.

The most abrupt slopes of the Tancítaro face the south and west, where the mountain rises precipitously to a height of 1,800 meters. The geologist says that he was struck with the fact that, in Michiocán, the Sierra Madre del Sur appears to be independent of the northern orographic system that characterizes Mexico.

SOUTH AMERICA

Sheep in Patagonia. In recent years sheep growing in Patagonia has become so important that the wool of this region is already beginning to have an influence on prices in the world market. During the last third of the 19th century sheep were introduced into Patagonia from the Falkland Islands and wool raising was undertaken in Tierra del Fuego and other regions near the Strait of Magellan and also at various places on the east coast. The industry spread to the north and flourished best on the dryer plains of the Patagonian steppes. In 1910, 11,251,346 sheep were grazing in the large territories of Neuquen, Rio Negro, Chubut, Santa Cruz, and Tierra del Fuego. It is expected that the number of sheep will surpass 12,000,000 during the present year. As agriculture becomes more intense in Argentina and is extending into the sheep grazing lands, the industry is pushing southward into Patagonia.

A Society to Study the Folk Lore of Chile. At a meeting of the Sociedad Cientifica "Antonio Alzate" held on July 4, 1910, City of Mexico, Professor Engerrand gave an account of the formation of a Chilean Society for the study of the country's folklore. The society was organized at the suggestion of Sr. Rodolfo Lenz, a German-Chilean and author of several works on the Chilean Indians and their languages. He has advised that the researches should be subdivided under the following headings:

I. Literature: (*a*) Poetry; (*b*) Prose.

II. Music, Dancing, Sculpture and Ornamental Arts.

III. Customs and Beliefs: (*a*) Holidays and Amusements; (*b*) Customs and Beliefs having reference to human life; (*c*) The material side of human life in general; (*d*) Social occupations and workers.

IV. Ordinary Language: (*a*) Theory of language; (*b*) The components of language.

Sr. Lenz calls attention to the importance of the study of the gradual alterations of words as a key to the history of civilization. He shows how Chilean words are in process of alteration at the present time and cites such examples as: *ruvulucion, turrumoto,* etc., which are used instead of *revolucion, terremoto,* etc. (*Mem. y Rev. Soc. Cient, A.A.* Vol. 29, Nos 7-12. Jan. to June, 1910, City of Mexico.)

Rubber along the Upper Orinoco. The rubber industry of southern Venezuela is pretty closely confined to the immediate flood plains of the tributaries, and the chief rubber producing section is along the Casiquiare. From the mouth of the Casiquiare to the Rio Negro, rubber trees are more plentiful than elsewhere in the Orinoco basin, and the population is larger than on many of the tributaries. The production in a single year on the Casiquiare and its tributary the Siapa amounts to 300,000 pounds. One of the principal towns in the rubber country is Fernandez de Atabopo at the junction of the Atabopo and Orinoco rivers. It is here that the rubber pickers collect at the end of the season to ship their product to Ciudad Bolivar. In the last few years the rubber crop of this district has reached as high as 400,000 pounds. (*Daily Consular and Trade Reports,* April 5, 1912, No. 81, p. 70.) The extraction of rubber generally starts in September and lasts until March or April, each Indian workman having 300 or 400 trees to tap. Since steamboat navigation on the Orinoco stops at the rapids of Atmes, the principal part of the product must be transported down the river by canoes to a few trading centers.

I. B.

EFFECTS OF DIMINISHED RAINFALL IN VENEZUELA. In spite of its periodically heavy rains and widely inundated flood plains, central Venezuela now and then has an unusually dry season. The winter rains of the past season have been light, and, as a consequence, forage on the llanos has been scant, the vegetable crop has diminished, the crop of cacao was seriously damaged, and the Orinoco was so low as to interrupt regular navigation. One steamer was damaged by running aground; others now end their voyage at Caño Colorado near the mouth of the northern distributary of the Orinoco. From this point the cargo is transshipped to light-draft river boats which take it to Ciudad Bolivar, the regular terminal port of the larger steamers under normal conditions. (*C. and T. Rep't.,* No. 99, April 26, 1912.) I. B.

AFRICA

THE SURVEY OF EGYPT. Captain Henry G. Lyons, late Director of the Survey Department of Egypt, prepared a summary for *Nature* (Vol. 89, 1912, No. 2214, p. 126) of the Report of the Survey Department, which has recently appeared, on the work done in 1910. The geodetic triangulation was carried southward, reconnaissance having reached Tema, about 450 kilometers south of Cairo, while angular measurements and latitude observations were completed as far as Etsa, about half way. Precise leveling in the delta is nearly complete, and is being pushed on towards Assuan up the Nile Valley, Assiut having been reached, and a branch line carried into the Fayum. The gravity survey of the Nile Valley was begun, and observations were being made at a series of stations between Cairo and Khartum. The magnetic survey of the Nile Valley up to Wadi Halfa was finished, and in 1911 its extension into the Sudan was to be undertaken. Topographical surveying added considerably to the material which will be used for the publication of maps of the Nile Valley and Delta in 1:50,000 and 1:10,000. The survey of Alexandria on the scale of 1:1,000 was completed, and that of Cairo was advanced. In geology the Department's labors were mainly directed to the Red Sea coast and especially that part of it near the petroleum region at the south end of the Gulf of Suez. A considerable number of cadastral and topographic maps will soon be added to the large number already published. These additional sheets will be welcomed; and the progress of this scientifically controlled survey in Northeastern Africa is watched with much interest outside of Egypt.

MORTALITY IN THE BELGIAN CONGO. An official report of the Belgian Congo shows that the death rate in that region among the white population has greatly decreased in recent years. This gratifying fact is due to increased knowledge of tropical hygiene, better medical service, and the multiplication of the comforts and conveniences of life. From 1900 to 1904 inclusive the average annual death rate per 100 white inhabitants was 6.79; in 1905, 5.69; 1906, 4.25; 1907, 4.38; 1908, 4.69; 1909, 2.62. The largest mortality occurred along the Lower Congo, and in the Equatorial District and the Bangala and Mobangi regions. The Province Orientale had the smallest death rate, in 1909, for example, 1.91. On the other hand, the death rate at Matadi in that year was 4.08. (Statistics from *Le Mouv. Géogr.* No. 13, 1912.)

WIRELESS TELEGRAPHY IN THE BELGIAN CONGO. According to the *London Times* (Weekly Edition No. 1840), the installation of wireless telegraphy recently established in the Belgian Congo is giving complete satisfaction. It is expected that Elizabethville, in the southern part of Katanga Province, will within a few months be in communication with Stanleyville, about 1,000 miles to the north. The post of Lisala is now communicating with Boma, Brazzaville, Kindu and Stanleyville, four of the more important settlements along 1,185 miles of the Congo.

FRUIT EXPORTS FROM THE UNION OF SOUTH AFRICA. In January this year (*Agric. Journ. of the Union of South Africa,* Vol. 3, 1912, No. 3, p. 431), the value of the fresh fruit exported from the Union was valued at $54,060. The chief exports in order of value were pears, peaches and plums. South African fruit develops in our winter season, reaches the London and New York markets early in March and is becoming a considerable item in the exports from that region. Some years were required to perfect methods of packing and shipboard storage so that this perishable commodity would cross the tropical belt without deterioration, but little loss is now incurred, and fine fruits reach the northern markets, command high prices and are sold before the fruit trees of England and the United States begin to blossom.

ASIA

THE PILGRIMAGE TO MECCA. According to *Nature,* the annual pilgrimage to Mecca has greatly increased since the building of the Damascus-Mecca Railroad. In the year 1880, about 92,000 pilgrims made their way to Mecca. This was about the average annual number of pilgrims. In 1904, when a part of the railroad was in operation, the number of pilgrims increased to about 200,000, and three years later, in 1907, 281,000 of the Faithful made the pilgrimage. These figures are taken from Turkish official statistics. Of the pilgrims about 113,000 were subjects of Turkey, 40,000 came from British India, 17,000 from North Africa, 16,000 from Russia, 15,000 from Persia, 13,000 from the Sudan and 12,000 from Central Asia.

EUROPE

EARTHQUAKES IN ITALY. Notices of the earthquakes recorded in Italy during the first ten and a half months of 1908, are given in the last four numbers of the *Bollettino* of the Italian Seismological Society. The catalogue briefly describes over 500 local shocks, and 94 distinct earthquakes. It is significant that local shocks frequently occurred at Messina, Reggio, and other places that were ruined towards the close of the year, showing the gradual preparation for the great impending earthquake. Full details are given of the eruption at Etna in 1908, which was accompanied by a remarkable series of earthquakes.

PERSONAL

Henryk Arctowski, of New York City, will endeavor, this summer, to write out the results of his latest scientific studies relating to: (1) The yield of corn in the United States; (2) Changes of temperature in the equatorial regions; (3) Annual variation of atmospheric pressure in the United States; (4) Climatic changes in Northern Europe during 1900-1909, a work for which he has collected a large amount of meteorological data.

Prof. A. P. Brigham expects to spend the early part of the summer at home, and to accompany the Trans-continental excursion in August.

Oliver L. Fassig, Section Director of the U. S. Weather Bureau at San Juan, Porto Rico, will spend the coming summer completing a report on "The Climate of Porto Rico." He has given the past three years to a study of the island, and to the reduction of observations made at about fifty climatological stations under the auspices of the U. S. Weather Bureau from 1899 to 1911. The report will probably be published by the Chief of the Weather Bureau at an early date.

OBITUARY

REAR-ADMIRAL GEORGE W. MELVILLE. Rear-Admiral Melville, Engineering Chief of the U. S. Navy, is dead. He was born in New York City in 1841. In 1879, as a member of the Jeannette Expedition commanded by Lieut. George W. De Long, he went to the Arctic, showed great efficiency during the long drift in the ice and the tragical experiences of that ill-fated party, and commanded the survivors who succeeded in escaping from the Lena Delta and returned to the United States. Later, he returned to the Lena River and recovered the records of the expedition and the bodies of Lieut. De Long and his companions. A gold medal was struck for him by special act of Congress, and several institutions honored him with degrees in recognition of his labors in behalf of science.

GENERAL

A BUST OF REAR-ADMIRAL PEARY. The clay model for a bust of Rear-Admiral Peary, executed by Mr. William Couper, is now on its way to Florence to be cut in Cararra marble. Mrs. Morris K. Jesup presents the bust to the American Museum of Natural History, and it will take its place among the other marble busts in Memorial Hall.

THE TENTH INTERNATIONAL GEOGRAPHICAL CONGRESS. The Organizing Committee, with the concurrence of the Permanent Committee in Geneva, has decided that the Congress shall be held in the week beginning March 27, 1913. The programme of the excursions after the Congress will be changed in consequence of holding the session in March instead of October as previously arranged.

ANOTHER MEDAL TO DR. CHARCOT. The Paris Geographical Society will present its gold medal to Dr. Charcot for the geographical results he achieved in the Antarctic by the *Pourquoi Pas?* Expedition.

MEDALS OF THE ROYAL GEOGRAPHICAL SOCIETY. The Founder's Medal has this year been awarded to Mr. Charles Montague Doughty for his explorations in Arabia, and the Patron's Medal to Mr. Douglas Carruthers, for his work in Turkestan and Arabia. The Victoria Medal, which is specially awarded for scientific research in geography, has been conferred upon Sir George H. Darwin.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

California under Spain and Mexico. 1535–1847. A Contribution Toward the History of the Pacific Coast of the United States, Based on Original Sources (Chiefly Manuscript) in the Spanish and Mexican Archives and Other Repositories. By Irving Berdine Richman. xvi and 541 pp. Maps,* charts, plans, appendix, index. Houghton Mifflin Co., Boston. 1911. $4. 9 x 6.

Though primarily a history of early California, this book contains an important amount of geographical data. One cannot help wishing that the geographical facts were more consciously used and that much more emphasis were placed on the geographic relations of historic movements. The earth appears to be merely land with places on it. Certainly the region exhibits better than most others the fact that conquest is interactive; that when man "conquers" Nature he at least bears the marks of a struggle. It would have been a wonderful tale, had Mr. Richman chosen to tell it from that standpoint, and reduced somewhat the rather tedious narratives of unimportant (*i. e.,* not really history-making) events. It is a very painstaking piece of work, remarkably well done in places, but not always well balanced.

Reading between the lines, one comes upon relations of much geographic interest. Southern California and northwestern Mexico, lying in the belt of horse latitudes, have a climate which, combined with remoteness from the rest of New Spain, long delayed the exploration of the region by land. Settlements were made and long maintained with extreme difficulty. The late development of the region is striking. Los Angeles was founded five years after the beginning of the American Revolution. Traffic by sea at least passed the Californian coast early in the 16th century, in spite of fogs and uncharted shores, chiefly because of the Spanish galleon trade with the Philippines. Slowly the head of the Gulf of California was discovered and mapped, trails were extended across the inhospitable Colorado desert, and outposts were established. Their fate often hung in the balance. The idea of conquest and religion ran hand in hand, with gold apparently a minor motive. A chain of missions finally led through the Coast Ranges from lower (extreme southern) to upper (San Francisco to Los Angeles) California.

The Indians long lived undisturbed in the great Central Valley, and, mobile and at least semi-nomadic, plundered the mission Fathers and their neophytes, a condition suggesting a second parallel line of missions farther east. The thin population of the country down to the early decades of the 19th century is astonishing. Horses and cattle were so numerous as at times to be shot merely to reduce their numbers; meanwhile the people were in dire want of even the most necessary garments. Trade was stagnant, at first for reasons of geographic position, later because of government interdictions. At last came the Russians from Alaska with otter skins, imploring food, and after them the American ships asking otter skins, hides, tallow, and bringing merchandise; thus a three-cornered trade sprang up, clandestinely on the part of the Californians, but not the less vigorous and important. Americans began to stream in over the California and Oregon trail, the Santa Fé trail, and by sea, and began effective encroachments. A great deal of so-called Spanish occupation was mere pretension; the inherited pretensions of Mexico in the Southwest, once disclosed, were exploded; war with Mexico brought an inevitable result. In 1849 the people adopted an American constitution and the old life rapidly declined. ISAIAH BOWMAN.

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* Listed under "Historical," *Bull.*, Vol. 43, 1911, p. 799.

Wheat-Growing in Canada, the United States and the Argentine, Including Comparisons with Other Areas. By W. P. Rutter. x and 315 pp. Maps, charts, bibliography, index. Adam and Charles Black, London. 1911. 3s. 6d. 8 x 5½.

This book contains a thorough study of the problem of wheat growing, not only as an agricultural feature, but also in its bearing on the commerce of the world. A bird's-eye view of the distribution of wheat fields in North and South America is first given. The soil, climate and various essentials of scientific farming, affecting the yield and quality of wheat, are clearly set forth. Following are chapters on the cultivation and harvesting of wheat, yield and cost of production, transportation, storage, marketing and price. The discussion of the transportation problem, which is often weak in many books, is especially commendable. The author believes that the United States is destined to depend more and more upon other countries for its supply. An adequate bibliography of wheat is included. R. M. BROWN.

The New Garden of Canada. By Pack-Horse and Canoe through Undeveloped New British Columbia. By F. A. Talbot. xii and 308 pp. Ills., map,* index. Cassell & Co., Ltd., London. 1911. $2.50. 8 x 5½.

A description of Mr. Talbot's journey through 1,200 miles of almost unknown country in which the Grand Trunk Pacific is now building its line, the second transcontinental railroad route of Canada. Mr. Talbot tells of his eventful journey, and gives his conclusions as to the economic and scenic value of that newly opening region. He has condensed these impressions in his paper published in the *Bulletin* for March (pp. 167-183).

Aus Mexiko. Von Orla Holm. Mit wirtschaftlichen und politischen Beiträgen von Ralph Zürn. viii and 244 p. F. Fontane & Co, Berlin. 1908. Mk. 3.50. 9 x 6.

The book is written for the use of the tourist rather than the scholar, not as a regular guide-book, however, but as an instructor about everything which the educated traveler ought to know of the country he is visiting: geography, history, religion, population, natural products, commerce and industry, finances, traffic, art, social conditions, immigration, foreign relations (especially to Germany and America). As the author is German himself, special credit must be given him for the unprejudiced frankness with which he acknowledges what

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* Listed under "British Columbia-Alberta" on p. 399.

American influence has done to improve Mexican conditions. He often holds up the enterprising American as an example for his more cautious countrymen, not with any intention to depreciate the good which they have done, but prompted by the desire to make them see their opportunities as Americans do theirs.

A book like this can naturally not be called scientific, but there is no doubt that it will satisfactorily fulfill the purpose for which it was written.

M. K. GENTHE.

Les États-Unis du Mexique. Par Cte. Maurice de Périgny. xi and 310 pp. Map.* E. Guilmoto, Paris. 1911. 5 fr. 50. 9 x 5½.

This work is a compilation of general information on Mexico. The writer's countrymen who may visit our sister republic will find much of interest in its pages. Many of the data are of a statistical nature. Some appear to have been culled from Mexican newspapers. The author hardly ever refers to his sources of information. His descriptions of native customs are accurate and make pleasant reading matter. Indeed they constitute the most agreeable feature of the book.

A short historical sketch and a review of social and industrial conditions fill the first few chapters. An attempt is then made to subdivide geographically the text of the last ten chapters. The intent is laudable, but the units used are not well differentiated. This is rather remarkable, as there are few regions whose physiographical or other types available for geographical description are more sharply defined than in Mexico. For example, the writer fails to grasp the significance of the eastern and western orogenic movements that gave rise to the high central plateau which is very abruptly cut off from the two coastal regions bathed respectively by the Gulf of Mexico and the Pacific Ocean. And yet he has set foot in both of the units thus created. His chapters contain excellent pen pictures of the various manifestations of life found in each. He notes the difference between the mountaineer peon and the inhabitants of the lowlands. The striking change in the vegetation as one travels up from the "tierra caliente" must needs have struck the attention of so observant a traveler as he reveals himself to be in other respects. The very alteration of the soil and of the rocks themselves, with the minerals they include, is exceedingly marked, so sudden is the transition from one type to the other. Had the author adhered entirely to such a classification as a major scheme and extended it subsequently for the sake of thoroughness, so as to comprise the southern region of high uplift along an E-W axis, and then made use of his climatological data as a minor subdivision, his readers would have had the subject before them in adequate geographical presentation. He is entitled to credit, however, for his endeavor to handle his work in this form. But the order in which his headings follow each other tends to bring out the fact that his pages have been taken bodily out of his note book and in the same sequence in which they were jotted down as he proceeded on his journey.

Mr. de Périgny naturally gives considerable space to mining, Mexico's foremost industry. His data on the production of some of the famous mines are interesting. Furthermore they are correct and free from the inaccuracies born of enthusiasm. But when he attempts to give geological information or to enter into technical details, the layman's ignorance becomes apparent. His description of the Dos Estrellas mines at El Oro is a case in point. He also calls attention to the progress accomplished in agriculture as well as to various growing industries of the Republic. In this connection his statements regarding the commercial and industrial activities of "les Nord-Américains" are decidedly unfair. He has not escaped falling into the error common to many Europeans who visit Mexico. No doubt, had he stayed longer in the country his opinion would have radically changed. He would have realized that most of Mexico's progress is due to contact with the people north of them; also that the material prosperity and comfort of a rising Mexican bourgeoisie has followed in the wake of American enterprise. His friendship towards his hospitable hosts has evidently prevented him from giving expression to the apprehension felt by every well wisher of Mexico in her present plight. Recent events, however, have brought to light certain phases of Mexican deficiency to which the writer has abstained from alluding. It is unfortunate that the book must be read with due provision in mind for this omission. The fact is that the writer has succeeded in giving an account of the country in the state of progress to which Diaz's ability brought it. As such his book will always be valuable. LEON DOMINIAN.

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* Listed under "Mexico" on p. 399.

Panama. The Canal, The Country, and The People. By Albert Edwards. x and 585 pp. Maps, ills., index. The Macmillan Co., New York. 1911. $2.50. 8 x 5½.

Our people have had Panama served to them in small and large doses for a number of years, and they may be so surfeited that a book with the above title may not appeal strongly to them. Although there is no new material in many chapters, yet the book is written with such freshness of treatment, and impressions are so vividly conveyed, that it is a worthy contribution to the already large library on Panama.

In a few chapters the author describes the two terminal cities of the Canal, the people, the republic, and gives a little of the geography of the Isthmus. Twenty chapters follow on the history of Panama, much of it bearing more or less directly on the growth of the republic, beginning with the discoveries of Columbus and ending with current topics. The book ends with a few chapters on the subsidiary problems of the canal, such as the management of the Canal Zone, the sanitation of the area, the life of the transplanted Americans, and the leaders of the undertaking. Altogether the book covers a large number of subjects relating to Panama, and it seems to have been carefully compiled.

R. M. BROWN.

SOUTH AMERICA

Brazil, its Natural Riches and Industries. (Foreign Edition.) Vol. I: Preface—Productive Industry. 384 pp. Maps,* ills. Vol. II: Agriculture, Communications, Manufacturing. 418 pp. Ills. Commissão d'Expansão Economica do Brazil. Aillaud, Alves & Co., Paris. 1910. 11 x 7½.

An official two-volume publication (foreign edition in English) issued by the Brazilian Government to supply information relating to all the industries carried on in the country.

A third of Vol. I is devoted to brief summaries of Brazilian history, geography and geology, growth of population by immigration, and advantages for commerce. The productive (extractive?) industries discussed are: (1) those having to do with natural vegetation, especially forest products; (2) products from wild animals; and (3) the mineral industries. Under productive plant industries rubber is the chief. A very good and comprehensive survey is made of the development of that industry, together with its industrial and commercial effects on Brazil. Much space is also devoted to the possibilities of trade in woods, of which the country has an infinite variety.

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* Listed under "Brazil" in *Bull.*, Vol. 43, 1911, p. 876, and under "Historical" in Vol. 44, April, 1912, p. 320.

The products of fishing and of the chase have so far attained but little importance in Brazil, despite the many species of animals which might contribute to such activities. The most interesting topic of this section is the account of the Brazilian whaling industry from Bahia.

Aside from the section on rubber, the great value of Vol. I lies in the survey of mineral resources and mining industries. Each of the two score kinds of mineral wealth comes in for some mention, but gold, iron, manganese, diamonds and coal stand out most prominently. The discussion of iron, however, gives but an inadequate idea of the magnitude of the rich deposits of Minas Geraes, which are just now being the object of much careful examination. The report makes it very evident that the fuel problem in Brazil is almost the leading one in point of interest. Rather optimistic statements are made concerning the possibilities of the coals from Santa Catharina and Rio Grande do Sul, but analyses of samples, from various places, do not confirm this optimism.

The report serves excellently to present the vast latent possibilities of Brazil, and shows, in most cases by statistical tables, what progress has been made in the various lines of production up to 1907. The second volume is better as indicating material progress in Brazil. WALTER S. TOWER.

El Uruguay á través de un Siglo (L'Uruguay à travers un Siècle). La jornada civilizadora realizada en la República Oriental del Uruguay y el brillante porvenir de esta nación Americana. Obra escrita por Carlos M. Maeso. 533 pp. Maps, ills. Tip. y Lit. Moderna, Montevideo. 1910. 15 x 11.

At first glance one asks: Why such a gigantic book about such a small country? A casual examination explains the unwieldy size; the book is printed in parallel columns of Spanish and French, and with a great profusion of illustrations (some very beautiful), statistical tables, charts and diagrams.

The object of the book is to show the progress made by the country during the first century (really only eighty years) of independent national existence. This is attempted by emphasizing especially what Uruguay is at present. All phases of activity, even to the Jockey Club, come in for their share of the discussion. Some of the more important sections deal with: the "land of Uruguay"; the city of Montevideo; commercial relations; agricultural and pastoral industries; transportation facilities, both by rail and by water; water and mineral resources; the Liebig Company; and the representative industrial and commercial establishments.

The discussion of "the land" is quite devoid of any statement of climatic influences which may affect it, and is generally descriptive rather than analytical. It is hardly as good as similar discussions to be found elsewhere, but it helps in some ways to support the claims that Uruguay is "a beautiful country," with "enchanting panoramas," "a rich soil," etc. Much the same criticism may be directed against the description of Montevideo. All who know that place are quite agreed that it is "one of the most beautiful cities of America," but statistics of building operations and passenger traffic on tramways, descriptions of streets and avenues, and catalogues of institutions scarcely prove the contention quoted above. What Montevideo is and what it stands for, after four generations of Uruguayan independence, is but poorly indicated in this part of the text. An examination of the illustrations in the volume will tell much more, in that way.

The sections dealing with commerce, and with agricultural and pastoral industries, deal with the real sinews of Uruguayan strength. These sections contain much valuable information, and, better than any other part of the monograph, they give an idea of Uruguayan progress during the last fifty years especially. Few statistical comparisons cover the whole period of independence. It is shown how Uruguay has made rapid commercial progress, with a fivefold increase since 1862, and how gratifying it is to Uruguayans to see the exports increasing somewhat more rapidly than imports, to see that their country exceeds in commercial importance some much larger American nations, and in per capita value of commerce compares very favorably with any. Staple exports like wheat, flaxseed, wool and jerked beef have special consideration, as also groups of wares and trade relations with leading countries. One is not surprised to find here a rather elaborate indictment of the United States merchant, owing to his failure to adapt himself to business methods in Uruguay.

The section on agricultural and pastoral resources can scarcely fail to convince everyone of the great possibilities of the country. Soil analyses from different sections indicate the "rich soil" so often mentioned, while the fact that less than 37 per cent. of the area was under cultivation (in 1906) proves that cropping has barely begun. The policy of encouraging railroad building is recognized as the best means of further development along this line. In fact, a brief but suggestive discussion of the "transformation of Uruguay" tells very concisely the ways in which governmental and private activities, with respect to transportation facilities, agricultural colonization, and development of resources in general, are making a new Uruguay.

For facts of every kind, except geologic and physiographic, this book is a mine of authoritative information. Its statistical tables, charts and diagrams are perhaps the most valuable single feature. WALTER S. TOWER.

AFRICA

A Travers la Chaouïa avec le Corps de Débarquement de Casablanca (1907–1908). Par le Capitaine Grasset. 231 pp. Maps,* ills. Hachette et Cie., Paris. 1911. Fr. 5.50. 7½ x 5.

This is a soldier's blunt tale in more than one respect. But the soldier shows himself a keen observer, as well as a man imbued with scientific tastes. His narrative is a record of the French military occupation of Moroccan territory from the summer of 1907 to that of 1908. A brief review of the events leading to French intervention is given first. The Moroccan question is treated with impartiality. No attempt is made to consider the subject from its broader standpoint as affecting international politics. The details of the military operations are presented in diary form. They throw light on the preliminary methods of colonization often forced upon European nations engaged in furthering the cause of civilization on the Dark Continent. It is especially those who have followed the growth of the vast colonial empire the French are building south of the Mediterranean who will be able to learn much from Captain Grasset's book. His account is all the more interesting, as he appears to have been able to understand the somewhat unintelligible psychology of the natives and their consequent attitude towards foreigners.

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* Listed under "Morocco" on p. 399.

Best of all, the author has embodied some valuable geographic data on the Chaouïa, in the form of an appendix. This territory was but imperfectly known before the advent of French officers. It lies between 34° and 32½° N. Lat., and extends some 175 kilometers west of longitude 6½° W. Its inhabitants have all the traits of the fanaticism peculiar to their race. This was primarily the reason why the country remained practically unexplored until about five years ago. In the short interval since then its orographic and hydrographic features have been investigated. Its broader geologic relations have been ascertained. The influence of these factors on the commercial and industrial data furnished by the author may be inferred from his descriptions. To the student these short scientific sketches form perhaps the most interesting portion of the book. Some excellent photographs also help to give a fair idea of the country.

LEON DOMINIAN.

Gold Coast Palaver. Life on the Gold Coast. By Louis P. Bowler. 173 pp. Portrait. John Long, Ltd., London. 1911. 7½ x 5.

A most unpretentious little book is this, its jacket of an appropriate yellow: just the things seen by a miner who has driven pick into the auriferous reefs of many lands and now on the Gulf of Guinea has found things which struck him as new and strange and likely to interest those whose lives have a shorter tether. Criticism is disarmed at the outset, for the man does not know the first rules of construction. After setting down a caption, if his story does not run to so much as a page, that is a chapter good enough for him. Lindley Murray might have a word to say to him, in fact a great many words, for he does as suits him best with the rules of grammar. Yet the reader is going to prove very cordial to this small narrative. It is such an intimate record of the little known land which lies back of the beach scarcely better known. Every experience here recorded shows itself genuine; no one can doubt its accuracy. There is a charm in the record of the unusual, particularly when it happens to some one else who chances to survive to tell the tale. There is a particularly happy incident of a houseboy who cautioned the author that the cook had "put medicine" into the soup, and when invited to taste his own pottage the cook shrieked "massa, dem soup kill man one time!" Here we have a sample of the jargon of West Africa, the Krooboy, a fecund *lingua franca* which will be found worthy of study by philologists. The sum of such examples amounts to a little more than a thousand words, but they have been found worth extracting for later study. It is upon such simple records as this that we must depend for the most valuable material. A dozen disconnected pages will yield rich treasure to the student of folk lore, particularly valuable as bearing upon Uncle Remus of our South and the Annacy of the West Indies. WILLIAM CHURCHILL.

Congo Life and Folklore. Part I: Life on the Congo as Described by a Brass Rod. Part II: Thirty-Three Native Stories as Told Round the Evening Fires. By the Rev. John H. Weeks. xxii and 468 pp. Ills., index. The Religious Tract Society, London. 1911. 5s. 8½ x 5½.

For the general reader the method of this book is singularly inept. Yet it is the general reader who is going, as soon as the treasure is pointed out to him, to forget the fault of method and to enjoy a really brilliant record of life on the lower Congo. The author, probably because he could thus best feel sure of publication, has chosen to write a volume intended to find a place in Sabbath School libraries in one of the straitest sects of English dissent; not only that, he has reverted to an absurd old fashion of having the story told by a mere rod of brass, the common medium of exchange value in the African jungle. Yet despite this forbidding fiction of construction the book is vivid, fairly crisp with life. Except for this absurd conversational bit of base metal the people stand out clear and distinct in the life which is theirs and show us what they are and how they live. The value of the book is ethnographic. Here, as throughout equatorial Africa, the keynote of interest for American students is Brer Rabbit. In these tales of the Congo—thankfully we note a hundred pages of them—the characters are the gazelle and the leopard. We find the tar baby in what must be its true beginning: the leopard sticks by virtue of the magic of unholy "juju" in the fetish image, a higher plane of thought than mere adhesion to sticky tar. Even in the Basubwa legend of Nakami the baby is coated with glue. In the country of Miss Cronise's "Cunnie Rabbit, Mr. Spider and the other Beef," in Sierra Leone, where we find a contamination of the Annacy mythos, it is to a wax girl that Mr. Spider sticks fast. If Mr. Weeks has done naught else for us he has given us the tar baby in its true and spiritual essence, the fetish image Nkondi. WILLIAM CHURCHILL.

Dr. Walter Volz. Reise durch das Hinterland von Liberia im Winter 1906-1907. Nach seinen Tagebüchern bearbeitet von Dr. Rudolf Zeller. 167 pp. Ills., maps. A. Francke, Bern. 1911. Mk. 3.60. 9½ x 6½.

The back country of Liberia has remained practically a *terra incognita* to this day. Most of the stimuli which promoted exploration elsewhere were lacking there. Prospective colonists preferred countries better suited for cultivation than its almost impenetrable woods, and its fauna and flora seemed too little diversified to make it especially attractive to scientists. In addition, the lack of personal safety throughout the territory acted as a general deterrent. For, without the protection of a strong mother country, the Liberian government was hardly able to maintain its foothold on the coast, and the hinterland was for a long time an apple of discord between the neighboring powers. It was not until 1908 that Liberia made good its claim on it, by taking formal possession of its native settlements, just in time to prevent its annexation by France. It is owing to this state of things that the information which this book contains was dearly bought by the untimely death of its author. It is based on the contents of his diary and note books, which were worked over by a friend and reproduced as much as possible in the author's own language.

Dr. Volz entered his field of work from Sherbro, Sierra Leone, crossing the western boundary of Liberia beyond Baiiama, and thus stepping directly into the back country without touching the Liberian coast. The first country which he traversed in Liberia was that of the Bande tribe, a region of moderate hills, with more or less swampy bottoms between, and where the villages were built on the hills. They had a more or less regular, circular shape, and were protected by live hedges, four or more in succession, instead of palisades, which were planted across the roads, and had one opening in the center for a door. Proceeding eastward towards Sambatahun, the country was found less densely wooded and less hilly. Tobacco and rice were cultivated in the bottoms. Deserted villages were plenty, testifying the belligerent mood of the Bele tribe farther to the south. The inhabited settlements were all fortified; the most important of them is Loma, where the author reached his most southerly point. There the houses, oval or rectangular in shape, were built on foundations considerably broader than the walls, so that they protruded from under them, forming a kind of step or bench all around the house. Only half of the area covered by the roof was enclosed by the walls; the other half formed an open piazza, covered by the roof and supported by four beams or poles. Slavery is still practiced there, in spite of the laws of the country.

At that place Dr. Volz received the first news of impending war, but resolved to proceed. Being detained at Loma for about three weeks, he used the enforced leisure to compose a comparative vocabulary of the five dialects spoken in the neighborhood, and collected information on the dreaded Bele, which affirmed earlier reports of their cannibalism. He finally reached Bussamai, the capital of the Siama, whence he sent a letter to the commander of the French detachment beyond the line, but waited in vain for an answer, and his letter probably never left the town. He then desired to go on to the French post, but carriers and guides were openly refused by the natives, who seem to have held the white man as a kind of fetish. So he was obliged to stay there in semi-captivity, and was killed in the attack on Bussamai by the French. M. K. GENTHE.

ASIA

The Coming China. By Joseph King Goodrich. xx and 298 pp. Ills., index. A. C. McClurg & Co., Chicago. 1911. 7½ x 5.

A great and ancient land without a name, the largest racial collocation in the world without a common language, it is small wonder that China is an ever present mystery. Its present time of trouble is bringing its crop of books; they have scarcely as yet begun to come from the presses. In such conditions the first and the last are sure to prove the more valuable; the first because the publishers are still exercising an intelligent choice in the material, the latter because they will represent the more mature judgment of the best authorities. None will dispute the standing of Prof. Goodrich, for to his service in the educational system of Japan he prefaced an experience of life in China which began in 1866 at Swatow, where European influence was at the minimum as compared with other treaty ports.

So far as relates to the greater events of history, those items which find place in annals and in formal record, Prof. Goodrich is commendably discursive. But his account is not on that score to be held superficial. He uses each such event, with which we may be assumed to be familiar, only as an identifying point and he employs it only so far as may serve fitly to introduce his chief objective, the character of the individual Chinaman. It is that which must underlie the course of China in its present upheaval; it is that which must assist us to some sort of comprehension of what is being done in the Middle Kingdom.

The Manchu (Tsing) dynasty has gone down in the present disorder. It ruled just eight years less than the Ming dynasty, which it succeeded; two other dynasties, the brief Mongol (Yüan) and the Sung, take us back to Alfred the Great. Mere dynastic change is trivial in the cycles of Cathay, it has happened so often. Giles's synoptical table presents thirty-nine such upheavals back to the first dynasty contemporary with the father of Noah. It is because this book reverts to the solidity of life in immemorial China that it is found so interesting and that it has such lasting value. WILLIAM CHURCHILL.

An Historical Relation of Ceylon, together with somewhat concerning Severall Remarkeable passages of my life that hath hapned since my Deliverance out of my Captivity. By Robert Knox. xlviii and 460 pp. Ills., autobiography, index, map.* James MacLehose & Sons, Glasgow, 1911. 12s 6d. 9 x 6.

At last we have the definitive edition of Knox, a work to whose publication Sir Christopher Wren lent his own great name and the credit of the Royal Society, which was translated into many languages, yet which for long has been hard to come by. No matter how much later investigations have disclosed Ceylon to our better knowledge, Knox must forever remain the basis and foundation, for he was the first European to reveal the ancient Taprobane. The present editor has performed his task with such reverent touch as marks the work of the great Hakluyt Society. The type chosen fitly suggests the dress of the first edition of 1681, the old cuts are reproduced by modern process, the very title-page with which Richard Chiswell put the new work on sale at the Rose and Crown is offered anew to our sight. To this reprint the editor has annexed the autobiography of Robert Knox which was strangely discovered in 1910 among the treasures of the Bodleian Library. This new material gives us information as to the early years of the author before his famous captivity. But more important is the sea life of Captain Knox after his captivity had dragged through a score of years. Here we find a record of the slave trade. After his own slavery he sees no injustice in setting others in bonds. He gives a view of the Madagascar coast, of Bencoolen in the swamps of Sumatra, of St. Helena, of Barbados, of gale and mutiny and the several haps of the sea, all most interesting in the record of geography when geography was nine-tenths adventure.

WILLIAM CHURCHILL.

The Land of Uz. By Abdullah Mansûr (G. Wyman Bury). xxviii and 354 pp. Map,† ills., appendices. Macmillan & Co., Ltd., London. 1911. $2.75. 9 x 6.

In introducing this work of a dashing explorer Major General Maitland speaks of "Mr. Bury's lively pages." The defect is fatal. When an untrained writer essays lively pages, the result is inevitably disastrous. Writing still is held the one trade which requires no apprenticeship. It is a pity, for this is a most interesting region over which the author has scouted, and frequently fought with wild men of a wild desert. His field is a small region at the southwestern tip of Arabia, Aden and the hinterland, so far as he could make his way by force or in disguise in the paths beset by folk who were always thieves and might become marauders. The map which accompanies the text will show the principal details of the country, yet it will not be found altogether successful in illustrating the text when the author chances to pin himself down to statement of routes traversed and villages visited. Authorities are by no means agreed in establishing a real Job in Yemen or the Hadramaut. The land of Uz may be no more than the scene of a philosophical drama, and that seems to be the light in which critical theology now regards it. But however we may feel about the manner of treatment, the fact remains that these are wholly untrodden paths. Not more than five travelers have ventured into this region at all. Mr. Bury has crossed their tracks here and there, but has never paralleled them, therefore his field is all his own. A German similarly situated would have marched each day nearer his monograph, Mr. Bury comes back with the tale of the joy of fighting and obscures the geographical detail with the smoke of his carbine or his fowling piece. But the geographical detail is there after all.

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* Listed under "Historical" on p. 400.

† Listed under "Arabia" on p. 399.

WILLIAM CHURCHILL.

Stalks in the Himalaya. Jottings of a Sportsman-Naturalist. By E. P. Stebbing. xxviii and 321 pp. Ills. and index. John Lane Co., New York, 1912. $4. 9 x 6.

This book, a continuation of a previous work by the author on "Jungle By-Ways in India," is an account of game hunting on the slopes of the Himalayas. Descriptions of stalking various animals are intended to illustrate the conditions under which they live and to show their adaptibility to the mountain slopes; and the writer selected many which he failed to procure. The first of these stories describes the quest of the goral (goat-antelope) and gives a good picture of the type of country where the goral lives. There are similar accounts of hunting stags, bears, tigers, leopards, serow, "likened to a cross between a cow, donkey, pig and goat," goats and sheep. It is amazing to read of the headlong flight of goats over country which the hunter, with the best of care, cannot follow, and the marvelous performances of the tahr and the markhor, representatives of the goat family, related in the closing chapters of the book, almost stagger belief. A few fine photographs of animals and many amateurish sketches illustrate the book. R. M. BROWN.

AUSTRALASIA AND OCEANIA.

My Adventures Among South Sea Cannibals. An Account of the Experiences and Adventures of a Government Official among the Natives of Oceania. By Douglas Rannie. 314 pp. Map, ills., index. J. B. Lippincott Co., Philadelphia. 1912. $3.50. 9 x 6.

Probably for a long time to come the story of Melanesia must be told after much this fashion, and it is a very vivid fashion indeed. We must either take this sort of adventure record by men to whom adventure was all in the day's work, or else we must turn to the missionary record. Honesty compels acknowledgment that the adventurer gives us our best contribution to geographical knowledge. Though coming to light after a long interval, this story of blackbirding in the Western Pacific will be noticed to agree most remarkably with Capt. Wawn's book upon the same topic. The two men represent diverse interests in the practice of what was really a slave trade, no matter how much it was sugar coated in phrase. Wawn found his profit in getting his hold most quickly filled with Melanesians to work the Queensland sugar plantations. Rannie was one of the first representatives of the system, always futile, by which Queensland sought to make this virtual slavery pass muster as contract labor. The master of a labor trader and the government agent were always warring forces; each unit transaction resulting in a slave was regarded by the two from opposite ends of the same diameter. Wawn and Rannie seem never to have been shipmates; in fact, Rannie nowhere mentions him, yet they were in the same region of the Pacific at the same time, and many events will be found common to the two narratives. Each is valuable as sketching in the results of reconnaissance into remote spots of earth which repel exploration and which must long remain neglected. The present reviewer was frequently in that region and met each of these recorders. With many of the events narrated in each record he became personally familiar and can avouch the honesty of the narrative.

The map which accompanies the story seems to have been inserted because it was some sort of a map of the Western Pacific; it is by no means in accord with the present state of our knowledge of the region and will be found of scant value in illustrating the work. In the matter of spelling, Mr. Rannie is quite phonetic, and probably will impose difficulty upon such as attempt to identify the scenes of his exploits. We have the missionaries to thank for settling upon some system of recording place names and, while on phonetic grounds their system is not perhaps all that could be desired, there is no reason why an author should break away from it. There is this excuse, however, to be noted: the charts of the British Admiralty have not yet adopted the standard spellings, and any man whose activity in the Pacific was exercised aboard ship would incline to the chart spellings. WILLIAM CHURCHILL.

EUROPE

The Magic of Spain. By Aubrey F. G. Bell. 264 pp. Index. John Lane Co., New York. 1912. $1.50. 7½ x 5½.

It is the magic of the things seen with an artist's eye and transcribed in a delightful style that will be conveyed to the minds of the readers of this book. Those whose advantage it has been to travel south of the Pyrenees will indeed discern the "parfum du terroir" exhaled from almost every page. How well the author has caught the spirit of the place can be detected even in his style, which, now and then, abounds with the sunny imagery that pervades Spanish literature. Here we have one of the many remnants of Moorish influence still strongly discernible in modern Spain. Mr. Bell might undoubtedly have alluded with greater emphasis to the potency of this Oriental undercurrent permeating Spanish life in explanation of the many customs which he describes so charmingly. Was he not aware of the fact that the many Spanish proverbs he quotes are but offsprings of similar sayings currently used in conversation in Damascus or Bagdad?

The chapters on Spanish literature will give a fair idea of the fundamental strains of naïveté and grandiloquence that hold sway over the Spanish mind. Life and Nature are looked upon to-day in Spain much in the light in which an inhabitant of medieval Europe saw them. Therein, perhaps, lies a good deal of the country's and the people's attractiveness. However it be, a full measure of this semi-Oriental and fascinating spell is given in Mr. Bell's book.

LEON DOMINIAN.

The Sea-Kings of Crete. By the Rev. James Baikie. xiv and 274 pp. Plans, ills., index. Adam and Charles Black, London. 1910. $2. 8½ x 5½.

To have the legends of Minos, overlord of the Aegean, of Theseus, whose success in solving the problem of the Labyrinth and killing the Minotaur won for him Ariadne, and of the marvelous Daedalus and his ill-fated son taken suddenly from the realm of fancy and placed in the category of history will be somewhat of a surprise to the general reader for whom this book is written. Furthermore, it may be expected that the neophyte in the field of archaeological literature will read with pleasure of the discoveries which tend to humanize Agamemnon and Achilles as they waged war against the stronghold of Priam, but he cannot be blamed if he fails to follow the tenuous thread of so delicate an argument and finally falls back on the conception he formed when reading the Iliad in school. The book is a compilation from the works of Schliemann, Evans, Murray, Browne, Hogarth and others, and presents a consecutive story which adds greatly to its value as far as the general reader is concerned. Most of the chapters are devoted to the results of excavations in Crete, and the main thread is found in the traditions which clustered around Knossos, the capital of Minos. The story of the Minoan kings is told from all the evidence accumulated at this site and at other places in Crete and on the Mediterranean. The conquest of the sea, the stages of culture during the various periods of Minoan civilization, the inferences concerning the conditions of life under the rulers and the repulses which finally marked the end of the sway of the Cretan kings are presented in so logical and convincing a manner that the discoveries of the archaeologists may now become the property of the general public. R. M. BROWN.

Cliff Castles and Cave Dwellings of Europe. By S. Baring-Gould. 324 pp. Ills., index. J. B. Lippincott Co., Philadelphia. 1911. $3.50. 9 x 6.

In this book are descriptions of many localities, under modern governments, where elaborate tunnels form the shelter of people living in various stages of civilization. The accounts of these cave dwellings are amazing, and it is difficult to believe that so primitive a stage of culture exists in highly civilized states of Europe. A reversion to savagery is not uncommon, and in cases it may be explained and condoned; but there is no condemnation too severe for the community which allows a reverted people to bring up children under their degraded status of living. This condition seems not to be unknown in any country, and minute accounts are given of these modern troglodytes in France, England and Scotland. There are also many instances where tunnels under the ground and in cliffs were used as habitations by refugees who were fearful of their lives under the stress of tyrannical states of society. A large number of cliff castles, subterranean churches, rock hermitages, rock monasteries, dens of robbers and rock sepulchres are minutely described by pictures, drawings and text. The work shows a vast amount of investigation, and no feature of the conditions of life in the caves of Europe seems to have been neglected. It is undoubtedly the most complete account of troglodyte life in historic times that has been published. R. M. BROWN.

EDUCATIONAL

High School Geography. Physical, Economic, and Regional. By Charles R. Dryer. Parts I and II. Physical and Economic. 340 pp. Maps, ills., index. American Book Co., New York. 1911. $1.20. 8 x 5½.

This is the first book of its type to appear. School men and geographers have been recommending that high school geography be "humanized" by the omission of the less practical phases of physical geography and substitution therefor of material on economic and regional geography. In this book Prof. Dryer gives eighteen chapters to physical geography and four to economic geography. A second book, on regional geography, is soon to appear. The two will constitute a one-year course.

The book is interesting in what it omits as well as in what it includes. Under the single heading—The Land—the author compresses Structure and Relief, Plains, Plateaus, Mountains, Hills, Valleys, Volcanic Lands and Earthquakes—

topics which make up a half dozen chapters in the usual text book. Dynamic processes come in for rather full treatment. Soil receives a short chapter (10 pages), and climate a long one (24 pages). The Sea, Coasts and Ports all together receive less space than Gradation by Running Water. The work of Ground Water and Wind are very briefly treated. Practically every topic includes a discussion of the *Economic Relations.* The geographical distribution of plants, animals and man has from 10 to 12 per cent. of the space. Natural resources, food, clothing, constructive materials, and the industries get nearly 20 per cent.

The topics omitted and those selected for treatment have been chosen with good judgment. The moderate size of the book is in its favor. The maps and other illustrations are excellent. More than twenty-five maps in colors are included. In style and diction the book seems better suited to mature readers than to young pupils in the high school. The treatment is terse, and the subject matter is thoroughly dependable, but the facts are not presented in so interesting a way as could be wished. R. H. WHITBECK.

Physiography for High Schools. By Albert L. Arey, Frank L. Bryant, William W. Clendennin, and William T. Morrey. vi and 438 pp. Maps, ills., appendix. D. C. Heath & Co., New York. 1911. $1.25. 8½ x 5½.

The authors are teachers in New York City high schools. Being the first modern physical geography written by high school teachers, one is anxious to discover if it differs essentially from the books written by college teachers for high school use. It does not appear that in either language or subject matter the book is easier or simpler than other physical geographies. The book is a fusion of the old ideas of physical geography and the newer ideas. The authors say frankly that they intentionally introduce topics which are usually treated under Astronomy, Geology, and Meteorology because high school pupils ought to study them. In this respect the book returns to the type in use a generation ago. More than usual attention is given to the economic phases of the topics treated, and this is highly commendable. Even more attention might well have been given to the economic side. In this particular the book reflects the newest ideas advanced by friends of physical geography.

Some of the illustrations are good and some are poor. There are few colored maps. Questions follow each chapter. The book is plainly modeled on the New York state syllabus. At least a brief treatment of land forms, soil, rocks and streams should come earlier in the book for the sake of autumn field trips. On the whole, the book is well balanced and sane. It represents both reactionary and progressive tendencies. R. H. WHITBECK.

PHYSICAL GEOGRAPHY

Earth Features and Their Meaning. An Introduction to Geology. For the Student and the General Reader. By William Herbert Hobbs. xxxix and 506 pp. Maps, ills., index. The Macmillan Co., New York. 1912. $3. 9 x 6.

A book of thirty-one chapters and several appendices, giving in a simple way and without too many technicalities the outline of modern geologic theory and knowledge. The earlier chapters deal with the figure of the earth, the study of rock materials, rock structures, earthquakes and earth movements, vulcanism, weathering and the other erosive processes, with a special emphasis on glaciation; the later chapters include the study of lake basins, lakes, and the origin and forms of mountains. Nine chapters are devoted to glaciation and the attending phenomena.

The book is simply and, as a rule, interestingly written. It is well illustrated, largely by wood cuts, and by a few selected half tones, contains a suitable series of references at the end of each chapter, and ought to form an excellent reading book for beginning pupils in college geology.

Modern theory is well summarized, and certain of the debated but interesting problems of geology are considered adequately, giving the various points of view held by different authorities, and with an excellent summary. This is particularly true of the chapters devoted to glaciation and the story of Niagara.

The author, as is to be expected, because of his special interest has devoted considerable attention to the phenomena of earthquakes and to the effect of faults in the earth's crust. The book is an excellent reference volume for students or laymen who are interested in a simple outline of geology with no thought of becoming specialists in the field. The excellent line diagrams in many places add materially to the clearness of the context. The volume has been tested in class work and should prove its worth. R. E. DODGE.

Revue de Glaciologie, No. 3 (Avril 1903–1er Janvier, 1907). Par Charles Rabot. 343 pp. Maps,* ills. Mémoires de la Soc. Fribourgeoise des Sciences Naturelles: Géologie et Géographie, Vol. 5, 1909.

These extremely valuable digests by Prof. Rabot, begun in the Annuaires du Club Alpin Français in 1902 to cover the events of the preceding year, and continued as No. 2 in the following year, are now issued in the third number to cover the four years from 1903 to the beginning of 1907. The subject of oscillation of glacier fronts is, however, brought up only to July, 1906.

There is a decided advantage in covering in a single number the longer period, since this permits of a greater differentiation of subjects as well as of a more satisfactory correlation of the data. The first chapter of the new booklet is devoted to snow and the measurements of snowfall; the second gives a review of general works which treat of glaciers and especially their physics and dynamics; the third section is concerned with glacial geography and includes references to the exploration of glaciers in many lands; while the fourth and last section is devoted to the variations in the advance or retreat of glaciers from 1903 to July, 1906. A work of this character by an authority like Prof. Rabot is one which no student of glaciers should be without, and it is to be hoped that means will be found for the continuation of these valuable summaries. WM. H. HOBBS.

GENERAL

Correspondence d'Alexandre de Humboldt avec François Arago (1809–1853). Par Dr. E. T. Hamy. xvi and 377 pp. Ills., index. E. Guilmoto, Paris. 1908. 3 fr. 50. 7½ x 4½.

Not one of the least meritorious achievements of the late Dr. E. T. Hamy has been the publication of correspondence between justly celebrated men of science of the past century. We have already reviewed in the *Bulletin* the collection of letters addressed by Humboldt to his friend and companion Bonpland, sent to the latter mostly while he was in a sort of "durance vile" in

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* Listed in *Bull*, Vol. 44, April, 1912, under "Alaska" on p. 316 and under "France" and "Norway" on p. 319.

Paraguay, under the despotic rule of Francia. This volume contains Humboldt's letters to one who stood as near to him, if not nearer, than the French botanist —to one to whom he was attached through common interest in studies to which he was more closely linked. Moreover, Arago, residing at Paris, which, for Humboldt, was as much of a home as Berlin, lived much nearer than the mewed-up friend at Asuncion, and intercourse was more frequent and more easy and regular. In addition to their common interest in science, Humboldt was drawn to Arago also by the influence which the early part of the lives of both had exercised. While the former's political ideas were of a more temperature nature than those of Arago, he still remained always under the impression which the maxims of 1789 had very distinctly colored and, while by birth an aristocrat (as well as in manners), he upheld a theoretical liberalism that enabled him to maintain intimate relations with extremists without jeopardizing his relations to King and Court, to which he was attached both by tradition and circumstance.

The collection embraces the period indicated above. It contains 124 numbers, the last one dated March 14, 1853. Only 115 are addressed to Arago, and even the first two (from 1809 and 1814) are given in abstract, the originals being lost. The nine letters at the end are addressed to members of the family of the deceased astronomer, and to several of his friends. The style of the documents justifies an observation made to me by somebody, about the French works of Humboldt: "It is beautiful German, written in French."

While the letters show the greatest intimacy between the two great men and extend over nearly every field of human activity, it appears from them that Humboldt had imbibed the true spirit of diplomacy, which was very well expressed to me once by a friend, a distinguished and thoroughly trained Brazilian diplomat of high standing. He said: "To say what it is your duty to say, and not to tell what must not be told, is the sum and substance of diplomacy." Humboldt freely alludes to public affairs, to political matters, in his communications, but he never "tells" anything but what is or can be public. With his intimate relations with the Prussian monarchs, and the constant intercourse with his brother Wilhelm and other diplomats, Alexander had conceived the true methods of diplomatic intercourse. Hence the political side of his correspondence is clear of confidential indiscretions, and distinct from the private correspondence published many years ago. Varnhagen von Ense, to whom that correspondence was addressed, was a diplomat himself, and many points could be touched upon with him on public affairs, and were alluded to. Arago was astronomer and physicist, hence letters to him, while containing also talk which might be called gossip, bear always upon scientific matters, even when gossip enters into their composition. The correspondence with Varnhagen von Ense, while not harmful, should never have been published, or only after very careful scrutiny, which was not observed by its editor.

The scientific interest of this volume is considerable. It presents the progress of science in Europe for nearly half a century and during a time when physical and natural sciences obtained the impulse under which they are moving to-day. Almost every branch is represented, geography coming in for a large share. At the same time it shows with what close and constant attention Humboldt followed the labor of others in every country; what a large part he had in fostering and assisting their progress, and what a sympathetic interest he took in everything and everybody that deserved it. While himself a student of paramount activity and solidity of thought and action, he was at once a "promoter" of the right sort, not a modern speculator upon the goods and means of kind souls who are mulcted for the benefit of enterprising schemers under the pretext of "advancement of science," for their personal benefit.

Humboldt had hardly any means of his own, since he sacrificed his patrimony for the South American exploration of 1799 to 1804, but he justly had the ear of wealthy patrons and made use of his position, not merely for himself, but for everyone he considered worthy of being sustained.

The correspondence is a chronicle of the development of scientific research, coupled with personal incidents making it additionally valuable in a biographical sense. And the man to whom it was addressed not only understood it thoroughly, but acted his part worthily in the same direction. There is nowhere a trace of jealousy, of covert disappointment at the discoveries of others. When political causes obstructed the path of Melloni, it was Humboldt who employed his standing with court and diplomacy to save him from distress; when young men loomed up in a manner showing prospective merit, and needful of protection in order to live and develop the resources of mind, he endeavored to find protectors for them, through his extensive acquaintance and great influence. Of all this the letters bear abundant testimony, without boasting, in a simple, perfectly natural manner, which shows that in helping others he thought only of performing a duty to science, by assisting its adepts. He follows with a keen interest every new step in physical science, aids in mathematical work, even at an advanced age, gives advice to those deserving it, but quite as often begs of his friend, not only opinions, but directions on many problems of research.

The letters abound in acknowledgements of gratitude to those who aided him in many ways. The King of Prussia deservedly heads the list. In the letters from eastern Russia the extraordinary munificence and valuable support, which the Imperial Russian government favored him with on his important journey to Central Asia, are duly acknowledged. If it should be true (Humboldt, in his correspondnce with Varnhagen von Ense, treats it rather as a joke) that England opposed his intention of entering India, thus blocking his favorite purpose, then the deportment of Russia would be in highly favorable contrast with that of the British government. In the present volume Humboldt makes no mention of it. His allusions to English scientists are not frequent, but usually courteous.

The great intimacy between Humboldt and Arago causes the former to allude to contemporaries and collaborators without reserve. In such remarks he discriminates between the scientific capabilities and labors and the personality of the man. The former are usually treated from a standpoint that would be encouraging to the individual; personal character and peculiarities are often the subject of amusing and even caustic, observations. Humboldt, like everybody else, had his likes and dislikes, and in either case they may prove mistakes. Hence we refrain from mentioning names. But these personal allusions are not merely interesting, they are often quite valuable. Distinguished men, scientists for example, are mostly known from the outside so-to-say, from what is public about their achievements. Here we have, in a form that was only intended to be private and even confidential, a great number of notes and appreciations about contemporaries, by one who judged them from various points of view, and who stood on a level of independence that gives exceptional weight to his judgment about persons. It is often gossip, but never indifferent. We see, in these forty-four years of talk about events and people, the scientific world of that period passed in review by one who was not a mere looker-on, but an active and very prominent participant; who knew what he was saying and the men of whom he spoke. Likes as well as dislikes are sometimes at fault, but are permitted as long as the motives are not unworthy. Of this, in the case of Humboldt, no trace can be found.

Impressions gathered in younger days are lasting and render sympathies and antipathies very durable. So the feeling of Humboldt for France and Paris, especially Paris, is marked to the last. While German in spirit and method of thought, he clings to French ideas and recollections with a sentimental tenacity, that is the result of the effusive type of feeling prevalent at the time when his career as explorer began. This effusiveness is equally marked in expressions of attachment and tenderness for his life-long friend. It is noteworthy and characteristic of Humboldt that it was not Arago that sought him but that it was he who, convinced of Arago's ability, made the first advances when the young astronomer was yet hardly known. Arago was seventeen years younger than Humboldt, and only twenty-three when the latter first wrote to him, at the age of forty.

The late Dr. Hamy, the editor, has increased the already great value of the book by his prefatory remarks and especially by the numerous biographical notes. They are, in fact, a brief biographical cyclopedia of such proper names as appear in the correspondence. The book as a whole does honor to the writer of the letters, to the man to whom they are addressed, and to its able and thoroughly informed editor. AD. F. BANDELIER.

Die Hauptsprachen unserer Zeit. Mit einer Einleitung: "Die wichtigsten Sprachen der Vergangenheit" sowie mit zahlreichen Schrift und Sprachproben und einer Sprachenkarte von Dr. Ludwig Harald Schütz. ix and 226 pp. Ills., map, index. J. St. Goar, Frankfurt am Main. 1910. Mk. 6. 9½ x 6½.

The book contains short characteristics of the linguistic qualities, script, and literature, of the principal languages of the world. After an introductory chapter on the dead languages: Greek, Latin, Hebrew, Phenician, Egyptian, Assyrian, Sanskrit, and the extinct Indian languages of Mexico, the author takes up the languages which are spoken to-day; in order of the number of people who use them. First, the languages of Eurasia: Chinese, English, Hindustani, German (inclusive of Dutch, Swedish, and Danish); the Slav languages; French, Japanese, Spanish, Malay, Italian, Turkish (including Hungarian), and Portuguese. The fact that the author associates Breton with French and the Basque dialect with Spanish, as well as the entire omission of Icelandic and Lithuanian, proves that his object was not to give a philologically safe division of his subject. African languages are divided into Semitic, Hamitic, Sudanese, Bantu, Hottentot-Bushman, and Hova; American languages into Eskimo and Indian (the latter illustrated by the example of the Dakota idiom) for North America, Nahuatl and Maya languages for Central America, and Tupi and Peruvian (Quichua) for South America. In Australia, several native dialects of Queensland, New South Wales, Victoria, West Australia and South Australia are briefly described, together with the languages of the Papuans of New Guinea and New Mecklenburg. A chapter on scientific, artistic, and artificial languages completes the array.

In the case of each of these languages, the alphabet, rules for pronunciation, principal characteristics of grammar and syntax, and examples from its literature are given, the literary examples in the original form, in Latin type, and in a translation.

It goes without saying that it is impossible for a novice to gain an appreciation or even more than a superficial idea of any one language by means of such cursory instruction, while readers acquainted with the respective languages have better resources with which to supplement their knowledge. But the geographer who struggles with the pronunciation of foreign names will find the book quite helpful, because it includes so large a number of idioms. M. K. GENTHE.

OTHER BOOKS RECEIVED

NORTH AMERICA

These notes do not preclude more extended reference later

THE RECORD OF A CITY. A Social Survey of Lowell, Massachusetts. By George F. Kenngott. xiv and 257 pp. Map, ills., index. The Macmillan Co., New York, 1912. $3. 9 x 6. [An exhaustive study of social conditions in a large manufacturing city. Dealing with the past of Lowell, its present population, the housing of the operatives, health, the standard of living, industrial conditions, social institutions, recreations, etc.]

CANADA. The Golden Land. The Story of Present Day Occupation of the Great West. By Arthur E. Copping. xvi and 263 pp. Ills. Hodder & Stoughton, London. George H. Doran Co., New York. 1911(?). $1.50. 8 x 5½. [Informing sketches of life, especially on the pioneer farms of the new wheat lands in the western provinces, with chapters on British Columbia and Ontario. Colored illustrations.]

PIONEERS IN CANADA. By Sir Harry Johnston. 328 pp. Maps, ills. Blackie & Son, Ltd., London, 1912. 6s. 8½ x 6. [Graphic descriptions of the work of Cartier, Champlain, Hearne, Mackenzie, and other leading explorers, with much information about the regions explored and the wild life they supported.]

CENTRAL AND SOUTH AMERICA

CHILE AND HER PEOPLE OF TO-DAY. An Account of the Customs, Characteristics, Amusements, History and Advancement of the Chileans, and the Development and Resources of Their Country. By Nevin O. Winter. xii and 411 pp. Map, ills., appendices, index. L. C. Page & Co., Boston, 1912. $3. 8 x 5½.

CENTRAL AND SOUTH AMERICA. Vol II, Central America and West Indies. By A. H. Keane. Edited by Sir Clements Markham. 2nd Edition. Stanford's Compendium of Geography and Travel (New Issue). xxvi and 496 pp. Maps, ills., appendix, index. Edward Stanford, London, 1911. 15s. 8 x 5½. [On the whole, the additions to our information concerning Central America and the West Indies since the first issue in 1902 are recorded, with, however, some mistakes in spelling and ,some statements now antiquated, carried over from the earlier volume.]

ASIA

THE CIVILIZATION OF CHINA. By Herbert A. Giles. Home University Library. 256 pp. Bibliogr., index. Henry Holt & Co., New York. 1911. 50 cents. 6½ x 4½. [Gives the outline of Chinese civilization from the earliest times to the present period of transition.]

AROUND THE BLACK SEA, Asia Minor, Armenia, Caucasus, Circassia, Daghestan, the Crimea, Roumania. By William Eleroy Curtis. 456 pp. Map, ills., index. George H. Doran Co., New York, 1911. 8½ x 5½.

Recueil des Traités conclus par la France en Extrême-Orient (1684-1902). Par L. de Reinach. Vol. 1, 442 pp. Vol. 2 (1901-1907), 146 pp. Ernest Leroux, Paris. 1907. 10 x 6½.

Turkestan: "The Heart of Asia." By William Eleroy Curtis. 344 pp. Map, ills., index. George H. Doran Co., New York, 1911. 8½ x 5½.

EUROPE

Nordost-Deutschland (von der Elbe und der Westgrenze Sachsens an) nebst Dänemark. Handbuch für Reisende. Von Karl Baedeker. xxx and 496 pp. Maps, plans, index. Karl Baedeker, Leipzig. 1911. Mk. 6. 6 x 4½.

Cypern. Eine Darstellung seiner Landesverhältnisse, besonders in politischer und wirtschaftlicher Beziehung. Von Davis Trietsch. Angewandte Geographie. 4. Serie. 1. Heft. 109 pp. Map, ills., index. Heinrich Keller, Frankfurt a. M., 1911. Mk. 4. 8½ x 6 [A model geographical study, with emphasis on industrial relations.]

Voyage a l'Ile Majorque. Par Jules Leclercq. 281 pp. Map, ills. Plon-Nourrit et Cie, Paris, 1912. 7½ x 5. [An excellent study and description of one of the most interesting islands in the Mediterranean.]

Cambridge County Geographies. Berkshire. By H. W. Moncton. x and 168 pp.; Carnarvonshire. By J. E. Lloyd. xi and 171 pp.; East London. By G. F. Bosworth. x and 256 pp. Index; Gloucestershire. By H. A. Evans. ix and 155 pp.; The Isle of Man. By the Rev. John Quine. x and 178 pp.; Monmouthshire. By Herbert A. Evans. ix and 183 pp.; Worcestershire. By Leonard J. Wills. ix and 154 pp.; University Press, Cambridge, 1911, except Gloucestershire, 1909. G. P. Putnam's Sons, New York. 45 cents each. 7½ x 5. [Maps, diagrams and illustrations in each. The general editor is Dr. F. H. H. Guillemard. Geography, natural history, antiquities, resources, etc., are included. The treatment is both sound and popular. Colored maps show the physical and geological features of each county.]

GENERAL

My Attainment of the Pole. Being the Record of the Expedition that First Reached the Boreal Center 1907-1909. With the Final Summary of the Polar Controversy. By Dr. Frederick A. Cook. Illustrations, appendix and index. xx and 604 pp. The Polar Publishing Co., New York, 1911. 10 x 7½.

The Unoccupied Mission Fields of Africa and Asia. By Samuel M. Zwemer. xvi and 260 pp. Maps, ills., index, appendices. Student Volunteer Movement for Foreign Missions, New York, 1911. 8 x 5½. [This survey includes Oceania. The maps as well as the text bring vividly to notice the vast spaces that have never yet seen a protestant missionary.]

Die deutschen Kolonien (Land und Leute). Von Dr. Adolf Heilborn. Dritte, verbesserte und vermehrte Auflage. Aus Natur and Geisteswelt. 98. Bändchen. iv. and 180 pp. Maps, ills., bibliogr. B. G. Teubner, Leipzig, 1912. 7½ x 5. [An excellent short account of the German colonies, and their native inhabitants. It would for all purposes be a good résumé of these over-sea possessions if more space had been given to development under the German régime. This important topic, however, is very cursorily treated.]

The Principles and Objects of Geology, with special Reference to the Geology of Egypt. By W. F. Hume. 25 and ix pp. Ills. Survey Dept., Ministry of Finance, Egypt. Cairo, 1911. 5 P. T. 10½ x 7 [Treaty of rocks, their origin, deformation, physical and chemical transformation, igneous and metamorphic rocks, etc.; with illustrative text drawn from the geological study of Egypt. Not too technical for general reading.]

Heredity in Relation to Evolution and Animal Breeding. By William E. Castle. xii and 184 pp. Ills. bibliogr., index. D. Appleton & Co., New York, 1911. $1.50. 7½ x 5. [An authoritative treatment of the subject dealing largely with the operations of Mendel's law of heredity.]

Der Ursprung des Menschen oder die gegenwärtigen Anschauungen über die Abstammung des Menschen. Von Prof. Dr. Alois Schmitt. xii and 118 pp. Index. B. Herder, St. Louis, Mo., 1911. 65 cents. 9½ x 6½. [Criticises some present views. Especially valuable for its excellent statement of the facts relating to the origin of man that are now generally recognized.]

Geografia Generale (Fisica, Biologica, Antropica). Di Cap.^{no} Giannitrapani. xxviii and 368 pp. Maps, ills. R. Bemporad & Figlio, Florence, 1912. 8½ x 5½. [A careful and good work, covering all phases of the subject that are essential to general geographical culture.]

Jahrbuch über die deutschen Kolonien. Herausgegeben von Dr. Karl Schneider. 4. Jahrgang. 257 pp. Maps, ill., index. G. D. Baedeker, Essen, 1911. Mk. 5. 9 x 6. [A geological map of Togo is one of the features. The principal papers will be noted in "Current Geographical Papers."]

Who's Who in Science (international) 1912. Edited by H. H. Stephenson. xvi and 323 pp. Index. The Macmillan Co., New York. 9 x 6. [Valuable in most respects, but worthless as a record of scientific geographers. Very few of the leading geographers of the world, men of international reputation, eminent in the universities and in their scientific output, are included.]

Meyers Grosses Konversation-Lexikon. Ein Nachschlagewerk des allgemeinen Wissens. Sechste, gänzlich neubearbeitete und vermehrte Auflage. Vol. 23, Jahres-Supplement, 1910-1911. 1008 pp. Maps, ills. Bibliographisches Institut, Leipzig und Wien, 1912. $2.68. 10 x 6½. [Stands in the front rank of annual compendiums of the world's events and progress.]

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

The Continent and Parts of it

Macdougal, D. T. North American Deserts. Map, ills. *Geogr. Journ.*, Vol. 39, 1912, No. 2, pp. 105-123.

Nansen, F. The Norsemen in America. Maps, ills. *Geogr. Journ.*, Vol. 38, 1911, No. 6, pp. 557-580.

Nickles, J. M. Bibliography of North American Geology for 1910. With Subject Index. 179 pp. *Bull.* 495, U. S. Geol. Survey, 1911.

Smith, J. P. The Occurrence of Coral Reefs in the Triassic of North America. *Amer. Journ. of Sci.*, Vol. 33, 1912, No. 194, pp. 92-96.

United States

Barrows, H. K., and Others. Penobscot River Drainage Basin. *Water-Supply Paper 261*, pp. 63-79. U. S. Geol. Survey, 1911.

Barrows, H. K., C. C. Covert and R. H. Bolster. Surface Water Supply of the United States 1909. Part 1. North Atlantic Coast. Ills, index. 309 pp. *Water-Supply Paper* 261, U. S. Geol. Surv., 1911.

Bowie, W. Triangulation along the Ninety-Eighth Meridian, Nebraska to Canada, and Connection with the Great Lakes. 342 pp. Maps. *Appendix 4*, *Report 1911*, Coast and Geodetic Surv., 1912.

Calvin, S. The Iowan Drift. Ills. *Journ. of Geol.*, Vol. 19, 1911, No. 7, pp. 577-602. Chicago.

Diller, J. S., E. S. Larsen, and Others. Gold and silver. Maps, geol. sections, plans, and ills. 122 pp. Advance Chapter from Contr. to Econ. Geol., 1910. *Bull. 470-B*, U. S. Geol. Surv., 1911.

Faris, R. L. Results of Magnetic Observations made by the Coast and Geodetic Survey between July 1, 1910, and June 30, 1911. Dept. of Comm. and Labor, Appendix No. 3, *Rep.* for 1911, pp. 79-158.

Flynn, N. F. Flora of Burlington and Vicinity. A list of the Fern and Seed Plants Growing without cultivation. Index. 124 pp. *Contr. to the Botany of Vermont* IX, Burlington, 1911.

Headden. W. P. The Occurrence and Origin of Nitrates in Colorado Soils, some of their Effects, and What they Suggest. *Proc. Colorado Sci. Soc.*, Vol. 10, 1911, pp. 99-122. Denver.

Hodge, F. W. Report of the Bureau of American Ethnology. *Ann. Rep. Bd. of Regents of Smiths. Inst.*, 1910, pp. 46-56. Washington, 1911.

Leighton, M. O. The National Aspect of Swamp Drainage. Ills. *Amer. Forestry*, Vol. 18, 1912, No. 1, pp. 3-13.

Macfarlane, J. J. United States Manufactures. Extent and Growth of Industry as Revealed by Census of 1910. Analysis of Industry by States. Map, diagram. *Commerc. Amer.*, Vol. 8, 1912, No. 8, pp. 9-13. Philadelphia.

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NEW MAPS

Edited by the Assistant Editor

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Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

Maps Issued by United States Government Bureaus

U. S. Geological Survey

Topographic Sheets

(Including Combined and Special Topographic Maps)

Alaska. Topography of Kasaan Peninsula, Prince of Wales Island, Alaska. Surveyed in 1907-1908. 1:62,500. 55°40′ - 55°25′ N.; 132°35.3′ - 132°5.0′ W. Contour interval 50 ft. Edition of Dec. 1911. Alaska Sheet No. 540A.

California. (a) Browns Valley Quadrangle. Surveyed in 1909. 1:31,680. 39°15′0″ - 39°7′30″ N.; 121°30′0″ - 121°22′30″ W. Interval 5 ft. Edit. of Nov. 1911.

(b) Landlow Quad. Surveyed in 1909-1910. 1:31,680. 39°30′0″ - 39°22′30″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. of Dec. 1911.

[Belong to the series of half-mile-to-the-inch maps of the Sacramento Valley].

California—Nevada. Bridgeport Quad. Surveyed in 1905–1909. 1:125,000. 38°30′ - 38°0′ N.; 119°30′ - 119°0′ W. Interval 100 ft. Edit. of Dec. 1911.

Colorado. (a) Montrose Quad. Surveyed in 1901–1902 and 1909. 1:125,000. 38°30′ - 38°0′ N.; 108°0′ - 107°30′ W. Interval 100 ft. Edit. of Nov. 1911.

(b) Mt. Jackson Quad. Surveyed in 1907–1909. 1:125,000. 39°30′ - 39°0′ N.; 107°0′ - 106°30′ W. Interval 100 ft. Edit. of Nov. 1911.

Idaho—Montana. Cataldo Quad. Surveyed in 1901, 1905 and 1909. 1:125,000. 48°0′ - 47°30′ N.; 116°30′ - 116°0′ W. Interval 100 ft. Edit. of Nov. 1911.

Illinois. Elizabeth Quad. Surveyed in 1909. 1:62,500. 42°30′30″ - 42°15′0″ N.; 90°15′ - 90°0′ W. Interval 20 ft. Edit. of Oct. 1911.

Iowa. Knoxville Quad. Surveyed in 1908–1909. 1:62,500. 41°30′ - 41°15′ N.; 93°15′ - 93°0′ W. Interval of 20 ft. Edit. of Jan. 1912.

Kansas—Missouri. Leavenworth and Vicinity. Surveyed in 1906–1909. 1:62,500. 39°30′ - 39°13′ N.; 95°8′35″ - 94°45′0″ W. Interval of 20 ft. Edit. of Oct. 1911.

Louisiana. Lake Providence Quad. Surveyed in 1909. 1:31,680. 32°52′30″ - 32°45′0″ N.; 91°15′ - 91°5′ W. Interval 5 ft. Edit. of Oct. 1911.

[Belongs to the series of half-mile-to-the-inch maps of the flood-plain of the Mississippi].

Maine—New Hampshire. Kezar Falls Quad. Surveyed in 1909–1910. 1:62,500. 44°0′ - 43°45′ N.; 71°0′ - 70°45′ W. Interval 20 ft. Edit. of Dec. 1911.

Montana. (a) Blackfoot Quad. Surveyed in 1907. 1:125,000. 49°0′ - 48°30′ N.; 113°0′ - 112°30′ W. Interval 20 ft. Edit. of Dec. 1911.

(b) Topographic Map of Glacier National Park, Montana. Surveyed in 1900–1904 and 1907–1910. 1:125,000. 49°6′ - 48°13′ N.; 114°30′ - 113°10′ W. Interval 100 ft. Edit. of Aug. 1911.

[A splendid map of this newly created National Park which includes the southern end of that part of the northern Rocky Mountains which is generally known as the Canadian Rockies and, with it, the southernmost of the glaciers which have given the more northern ranges their reputation for scenic beauty. The part of the map south of 48°30′, or immediately north of the Great Northern R.R., is new. The remainder has been combined from the Kintla Lakes, Chief Mountain and Browning quadrangles].

New York. Canton Quad. Surveyed in 1910. 1:62,500. 44°45′ - 44°30′ N.; 75°15′ - 75°0′ W. Interval 20 ft. Edit. of Nov. 1911.

North Carolina. Lincolnton Quad. Surveyed in 1909. 1:62,500. 35°30′ - 35°15′ N.; 81°30′ - 81°15′ W. Interval 20 ft. Edit. of Nov. 1911.

North Dakota. Ray Quad. Surveyed in 1906 and 1909. 1:125,000. 48°30′ - 48°0′ N.; 103°30′ - 103°0′ W. Interval 50 ft. Edit. of Nov. 1911.

Ohio. Loramie Quad. Surveyed in 1909. 1:62,500. 40°30′ - 40°15′ N.: 84°30′ - 84°15′ W. Interval 10 ft. Edit. of Sept. 1911.

Pennsylvania. Franklin Quad. Surveyed in 1909. 1:62,500. 41°30′ - 41°15′ N.; 80°0′ - 79°45′ W. Interval 20 ft. Edit. of Nov. 1911.

West Virginia. Madison Quad. Surveyed in 1908–1909. 1:62,500. 38°15′ - 38°0′ N.; 82°0′ - 81°45′ W. Interval 50 ft. Edit. of Aug. 1911.

Wyoming. (a) Canyon Quad. Surveyed in 1884–85; partial revision, 1910. 45°0′ - 44°30′ N.; 110°30′ - 110°0′ W. Interval 100 ft. Edit. of July 1911.

(b) Gallatin Quad. Surveyed in 1883–85; partial revision in 1910. 1:125,000. 45°0′ - 44°30′ N.; 111°0′ - 110°40′ W. Interval 100 ft. Edit. of Sept. 1911.

(c) Lake Quad. Surveyed in 1885; partial revision in 1910. 1:125,000. 44°30′ - 44°0′ N.; 110°30′ - 110°0′ W. Interval 100 ft. Edit. of Sept. 1911.

[Revised edition of three of the four quadrangles which comprise Yellowstone National Park].

Geologic Sheets Accompanying Folios of the Geologic Atlas of the United States

Maryland–West Virginia–Pennsylvania. (a) Hancock Quadrangle. Surveyed in 1904–10. 1:62,500. 39°45′ - 39°30′ N.; 78°15′ - 78°0′ W. (1) Areal Geology. Contour interval 20 ft. 21 colors. Edition of Oct. 1910. (2) Structure Sections. 23 colors. Edit. of Dec. 1910.

(b) Pawpaw Quad. Surveyed in 1904–10. 1:62,500. 39°45′ - 39°30′ N.; 78°30′ - 78°15′ W. (1) Areal Geology. Interval 20 ft. 18 colors. Edit. of Oct. 1910. (2) Structure Sections. 18 colors. Edit. of Dec. 1910.

Accompany "Pawpaw–Hancock Folio (No. 179)" by G. W. Stose and C. K. Swartz, 1912.

Pennsylvania. Claysville Quad. 1:62,500. 40°15′ - 40°0′ N.; 80°30′ - 80°15′ W. Interval 20 ft. (1) Areal Geology. Surveyed in 1905, 1908–1910. 8 colors. Edit. of March 1911. (2) Structure and Economic Geology. Surveyed in 1905, 1908–1910. 10 colors. Edit. of March 1911. (3) Oil and Gas Surveyed in 1906 and 1908. 14 colors. Edit. of Oct. 1911. Accompany "Claysville Folio (No. 180)" by M. J. Munn, 1912.

Maps Accompanying Publications

MARYLAND WEST VIRGINIA PENNSYLVANIA. (a) Drainage Map of the Pawpaw and Hancock quadrangles, showing the "trellis" arrangement of the streams. [1:260,000]. [39°45′ - 39°30′ N.; 78°30′ - 78°0′ W.].

(b) Abandoned channel of Potomac River near Pawpaw, W. Va. [1:65,000]. [39°33.3′ - 39°30.0′ N.; 78°31.4′ - 78°26.0′ W.]. Interval 50 ft.

(c) Oxbow cut-off in Sleepy Creek at Johnsons Mill, W. Va., southeast of Berkeley Springs. 5 in. = 1 mile (1:12,672). [39°34′ N. and 78°12′ W.]. Interval 20 ft.

Figs. 3, 10 and 11, Pawpaw–Hancock Folio (No. 179), *Geol. Atlas of the U. S.*, 1912.

PENNSYLVANIA. (a) Map showing general structural features in southwestern Pennsylvania by contours on the horizon of the Pittsburg coal. [1:3,900,000]. [40°30′ - 39°45′ N.; 80°30′ - 79°30′ W.]. Interval 50 ft.

(b) Sketch of Claysville quadrangle, showing convergence of the top of the Washington limestone and the top of the Gordon sand . . . [1:195,000]. [40°15′ - 40°0′ N.; 80°30′ - 80°15′ W.].

(c) Sketch map of oil and gas fields of western Pennsylvania and adjoining States. [1:2,000,000]. [42°15′ - 39°30′ N.; 81°15′ - 77°40′ W.].

Figs. 4, 5 and 6, Claysville Folio (No. 180), *Geol. Atlas of the U. S.*, 1912.

UNITED STATES. [Three maps of the United States, 1 : 7,000,000, limited by 51° - 25° N. and 129° - 65° W., compiled by Henry Gannett; edition of Nov. 1911.] (a) United States: Base Map. 2 colors. (b) United States: Contour Map. 3 colors. (c) United States: Relief Map. 10 colors.

[Of these standard maps, map (a) shows hydrography and towns only, map (b) also shows contours (interval 500 ft. in the East, 1,000 ft. in the West), while map (c) shows contours with altitude tints. In the present edition of the last map a return has been made to the use of dark tints to designate the highest elevations. The color gamut now runs from olive green through pale green and increasing shades of brown to a deep mauve. The Coastal Plain is thus brought out more strongly than on the previous edition (March 1910), and the exaggerated importance given the 2,000 ft. contour of the Plains in that edition has been reduced. The map has continuously been improved since its inception as Pl. CVII of the 13th Report of the U. S. G. S. for 1891-92].

UNITED STATES-CANADA. North America 1:1,000,000. [Sheet] North K 19: Boston. Preliminary proof. 44° - 40° N.; 72° - 66° W. 3 colors. Compiled, engraved and printed by the United States Geological Survey, Washington, Sept. 1911.

[Comment on this, the first sheet of the International Map of the World on the scale of 1:1,000,000 to be published of the United States, will be deferred to a later number of the *Bull.*].

NORTH AMERICA

CANADA

BRITISH COLUMBIA-ALBERTA. Map of New British Columbia Showing Line of Grand Trunk Pacific Railway and Author's [F. A. Talbot's] Route from Wolf Creek to Prince Rupert. [1:1,900.000]. 55⅓° - 52¾° N.; 131° - 113° W. Accompanies "The New Garden of Canada" by F. A. Talbot, London, etc., 1911.

ONTARIO-QUEBEC. Northern Ontario: Mineral District. 1:250,000. 49°0′ - 46°15′ N.; 81°36′ - 78°54′ W. 3 colors. 2 sheets. Department of the Interior [Ottawa], 1911.

[In execution identical with the sheets of the "Standard Topographic Map". District shown lies between Lakes Nipissing and Abitibi; includes Lakes Timagami and Timiskaming].

UNITED STATES

ILLINOIS. Base Map of Illinois Prepared in Cooperation with the United States Geological Survey. 42°30′ - 37°0′ N; 91°33′ - 87°32′ W. 3 colors. State Geological Survey [of Illinois]. 1911.

[Map showing the topologic elements—railroads, township and county boundaries, places, etc.—with great accuracy. Numerous elevations given: U. S. G. S. bench marks to the nearest tenth of a foot, railroad stations to the nearest foot. Based on Land Office plats adjusted to surveys by the U. S. Army Engineers, the Coast and Geodetic Survey, the Misssissippi River Commission, etc. In aspect similar to the route maps of the Post Office Department. Copies may be had for 10 cents by applying to the Director, State Geological Survey, Urbana, Ill.].

MEXICO

MEXICO. Mexique. 1:11,000,000. [34° - 14½° N.; 117° - 86½° E.]. Accompanies "Les Etats-Unis du Mexique" by M. de Périgny, Paris, 1911.

[Shows railroads and state boundaries].

CENTRAL AMERICA AND WEST INDIES.

TRINIDAD. Map of the Island of Trinidad originally designed by Capt. Mallet, R. E. Revised and brought up to date from the latest available official & private surveys. 1:89,100. 10°53′ - 9°56′ N.; 61°57′ - 60°51′ W. 7 colors. 4 sheets. G. W. Bacon & Co., Limited, London, 1912.

[Large scale map showing railroads, carriage and other roads, wards and county boundaries. Relief indicated in a rather elementary way in the form of "caterpillar" ridges].

AFRICA

MOROCCO. (a) La Chaouia par le Cap'ne Grasset. 1:1,000,000. 34°5′ - 32°40′ N.; 8°25′ - 6°40′ W.
(b) Plan de Casablanca et de ses Environs [1:30,000] [33°40′ N. and 7°34′ W.].
Accompany "A Travers la Chaouia . . ." by Capt. Grasset, Paris, 1911.

ASIA

ARABIA. The Land of Uz [southwestern Arabia]. 12 miles to 1 inch approx. [1:750,000]. [15°15′ - 12°45′ N.; 44°15′ - 47°10′ E.]. 1 color. With inset showing limits of main map; 3 colors. Accompanies "The Land of Uz" by Abdallah Mansûr (G. Wyman Bury), London, 1911.

CHINA. [Map of Chekiang]. [1:1,800,000]. [32° - 26⅔° N.; 118° - 122⅔° E.]. Accompanies "Half a Century in China" by A. E. Moule, London, etc. [1911].

PALESTINE. Karte des Ostjordanlandes aufgen. von Dr. G. Schumacher, herausgeg. vom eutschen Verein zur Erforschung Palästinas. 1:63,360. Blatt A4. 32°40′ - 32°25′ N.; 35°30′ - 35°52′. 5 colors.

[The map of which the above is a sheet and the map on the same scale in 26 sheets published by the Palestine Exploration Fund are the standard detailed topographic maps of Palestine. The German map supplements the English map in that it represents the country east of the Jordan. Other sheets listed under "Palestine," *Bull.*, Vol. 43, 1911, p. 709.]

PERSIA. (a) Map of Persia. 1:5,000,000. 42° - 25° N.; 40° - 65° E. 7 colors.
(b) Map of Dr. Sven Hedin's Route from Teheran to Seistan. 1:1,500,000. 36° - 29⅔° N.; 50½°-62⅔° E. Oriented N. 30° W. 7 colors.
Accompany Vols. I and II, respectively, of "Overland to India" by S. Hedin, London, 1910.

[Map (a) a general map showing Sven Hedin's routes in 1885-86, 1890-91 and 1905-06. Map (b) is based on a reduction to 1:300,000 of the author's original manuscript map in 232 sheets. It shows his routes in 1905-06. Both maps distinguish between sand and salt deserts (*kevir*)].

Tibet, Burma, etc. Carte du Haut-Assam. [1:13,500,000]. [31° - 26° N.; 91½ - 100 E.]. Accompanies on p. 135, "Les Royaumes des Neiges (Etats Himalayens)" by C.-E. Bonin, Paris, 1911.

[Gives names of tribes.]

Transcaucasia. (a) Skizze des Gefechtsfeldes bei Kars (nach Greene). 1:600,000. [40°45' - 40°15' N.; 43°10' - 43°50' E.].

(b) Skizze der Ruinenstadt Ani (nach Lynch). 1:20,000. [40°30' N. and 43°40' E.].

Accompany, on pp. 45 and 61 respectively, "Durch Armenien, und der Zug Xenophons" by E. v. Hoffmeister, Leipzig and Berlin, 1911.

Turkey in Asia–Persia, etc. (Karte I zu v. Hoffmeisters) Durch Armenien. Eine Wanderung. Entw.: v. Hoffmeister. 1:2,000,000. 42°15' - 38°55' N.; 38°20' - 45°50' E.

(b) (Karte II zu v. Hoffmeisters) Zug des Xenophons bis zum Schwarzen Meere. Entworfen: v. Hoffmeister. 1:4,000,000. 42⅓° - 31° N.; 35½° - 48½° E.

Accompany "Durch Armenien, und der Zug Xenophons" by E. v. Hoffmeister, Leipzig and Berlin, 1911.

[Map (b) a reconstruction of the route of the Ten Thousand Greeks.]

EUROPE

Italy. (a) The Val d'Arno as it once was [geologically]. [1:800,000]. [44°25' - 43°15' N.; 9°50' - 11°35' E.].

(b) The Trade Routes [leading to Florence]. [1:1,100,000]. [44°45' - 43°15' N.; 9°45' - 12°30' E.].

(c) Florence in her elements. [1:10,000]. [43°46' N. and 11°15' E.].

Accompany, on pp. 8–9, 44–45, and 76–77, respectively, "Florence, Past and Present" by J. W. Brown, New York, 1911.

Scotland. International Map: Europe 1:1,000,000. Published at the Ordnance Survey Office, Southampton, in 1911. (1) [Sheet] North O 29: The Hebrides. Unrevised proof. 60° - 56° N.; 12° - 6° W. 10 colors. (2) North O 30: Scotland–The Highlands. Unrevised proof. 60° - 56° N.; 6° W. - 0°. 12 colors.

[Comment on these, the first two sheets of the International Map of the World on the scale of 1:1,000,000 to be published of the British Isles, will be deferred to a later number of the *Bull.*]

Sweden. Hydrografisk Öfversiktskarta öfver Sverige. 1:1,500,000. 69⅓° - 55⅔° N.; 11° - 25½° E. 13 colors. Hydrografiska byrån [Stockholm].

[Shows limits of drainage basins, distinguishing them by colors according to four size groups, viz.: less than 200 sq. km., 200 - 1,000 sq. km., 1,000 - 10,000 sq. km., more than 10,000 sq. km. Regions above tree line indicated.]

Switzerland. (a) Uebersichtsplan der Stadt Zürich. 1:5,000. [47°25'12" - 47°19'8" N.; 8°28'9" - 8°35'29" E.] 8 colors. 9 sheets. Vermessungsamt der Stadt Zürich. Sept. 1905–March 1908. Printed by Kartographia Winterthur A. G., formerly Topogr. Anstalt Winterthur: J. Schlumpf.

(b) [Two sheets of the] Uebersichtsplan der Stadt Zürich. 1:2,500. Blatt II. March 1911. Blatt XV. Oct. 1908. Vermessungsamt des Stadt Zürich. Printed by Kartographia Winterthur. A G.

[Map (a) an exemplary map of a city and its environs. Culture is shown with the exactitude customary in cadastral maps: buildings, streets, railroads, etc., being delineated in their true proportions. In the representation of relief, however, this map is far superior to most maps of this nature. Its contours were not, as is usually the case, deduced by interpolation from the elevations of a great number of salient points; each contour was individually determined in the field by leveling and its course plotted. The resulting curves are the mathematical lines which, theoretically, contour lines are intended to be. Cf. a detailed review in *Pet. Mitt.*, Vol. 58, I, pp. 311–312. The houses are in red, public buildings in mauve, open land in buff, woods in pale green, parks, cemeteries, etc., in yellow green, drainage in blue, and ccutours (interval 4 meters) and supplementary hachures in brown.

The two sheets listed under (b) are parts of the cadastral map of Zurich on a scale twice as large as the map listed under (a). In execution the same: contour interval 2 meters].

WORLD AND LARGER PARTS

Mediterranean Region and the Near East. Region of the Mediterranean and Near East. 1:4,000,000. 50° - 24° N.; 14° - 61° E. 12 colors. With "Index to Ports on Mediterranean, Black and Caspian Seas." In 2 sheets. G. W. Bacon & Co., Ltd , London.

[Usual type of map with political coloring. Steamship routes and navigable courses of rivers shown].

Ottoman Empire. Wand-Karte des Osmanischen Reiches von W. von Diest, Oberst a.D. und Dr. M. Groll, Lector an der Universität Berlin. 1:1,250,000. 45¾° - 28¼° N.; 18⅓° - 51⅔° E. 7 colors. With 2 insets: (1) Das Osmanische Reich mit seinen Nachbar-Ländern. 1:10,000,000. 48½° - 10° N.; 5° W. - 78° E. 6 colors. (2) Religionskarte der Erde. Mercator's projection [equatorial scale: 1:182,000,000]. 6 colors. In 4 sheets. Gea-Verlag, Berlin, 1911.

[An excellent wall map drawn with the bold generalization necessary to insure legibility at a distance. The map is in physical coloring: it does not, however, use the usual green for the lowlands, the color scheme ranging from gray by way of light brown to darker brown; relief is in generalized shading. Railroads (different symbols for standard and narrow gage) and steamship lines in red; roads (separate symbols for main roads and caravan routes) and telegraph lines in black; boundaries in green; nomenclature as far as possible in Turkish. The qualifications of the two compilers insure both regional and cartographic excellence.]

HISTORICAL

Ceylon. A New Map of the Kingdom of Candy Uda in the Island of Ceylon. [1:1,300,000. Scale incorrectly given as 1:400,000 approx.] [Facsimile. 1681.] Accompanies "An Historical Relation of Ceylon, etc." by R. Knox, Glasgow, 1911.

BULLETIN

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A GEOGRAPHIC STUDY OF DULUTH

BY

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Introduction. The City of Duluth holds a rather unique position among the cities of the country because of its youth, its rapid growth, and its association with one of the world's most important resources. Its location, topographically, geologically and climatically, as well as geographically, brings about a combination of conditions which arouses the interest of nearly all its visitors. These conditions are worthy of special consideration because they are so clearly bound up with the geography of not only the locality itself but a vast territory immediately adjacent. The city has had an exceptional, though conservative growth. On the one hand, it shows distinctly the characteristics of a small city; on the other hand, it displays the spirit of a metropolis, and in many respects exhibits the characteristics as well.

To the student of geography it presents not only a most fascinating study but offers an opportunity for a practical geographic study. With the idea of combining both the theoretical and the practical, this paper has been prepared. Not only has the unsatisfactory "boom" literature been thoroughly studied, but individuals have been interviewed who have witnessed the city grow, who have played an important rôle in its growth, and who even to-day have a hand in shaping its destiny.

Location. Duluth is located in latitude 46° 48′ north and longitude 92° 6′ west. It lies on the western shore of the southwestern end of Lake Superior. At this place the tapering extension of the world's largest inland lake ends in a bay which, with its protecting spits and bars, forms one of the world's most efficient harbors (Figs. 1-3).

The city lies in the northeastern part of Minnesota, at the mouth of the St. Louis River, and at the head of navigation on Lake Superior. It is essentially in the center of the North American continent and in the extreme north central part of the United States. Therefore, so far as mere geographic distance is concerned, Duluth is close to all important points in North America and easily accessible from all directions—a decided advantage.

Topography. Although situated on a lake shore, it is not upon a flat. In fact, the larger part of the city is located on the southeastern slope of a rather steep range of hills which parallels the lake shore (Fig. 2). The range is steepest at a point opposite the industrial center of the city, that is, opposite Rices Point. Immediately to the southwest and to the northeast the gradient of the slope becomes less steep. A few creeks dissect the hillside, increasing the steepness of the gradients in places, thereby adding considerably to the scenic beauty. Practically the only flat land is that on Minnesota Point, Rices Point, and a narrow strip bordering the western bank of the St. Louis River. This distribution of hill and flat has constituted an advantage at times, and again a distinct handicap.

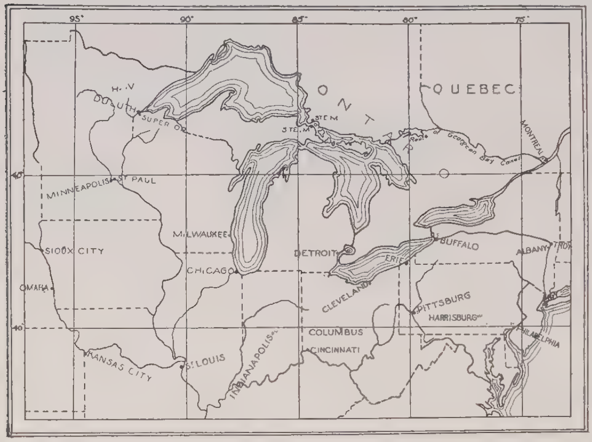

FIG. 1—Outline map to show location of Duluth with reference to the Great Lakes and Vicinity.

The shape of the city is elongate; its maximum length, 20 miles, is about four times its maximum width, 5 miles (Fig. 3).

Geology. The geology of the Duluth region is very complex. In this discussion only the larger factors are noted (Fig. 2). The basic rocks are among the oldest known on the earth's surface, belonging to the Keweenawan formations of the Proterozoic era.*

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* Chamberlin and Salisbury Geology, Vol. II, pages 148–149, 1904.

The rocks are primarily lavas, gabbros, diabases, basalts, and other igneous formations, most of which possess a schistose structure. Economically, these rocks are a hindrance, as their extreme hardness and lack of natural lines of fracture make excavations in them most difficult, and therefore expensive.

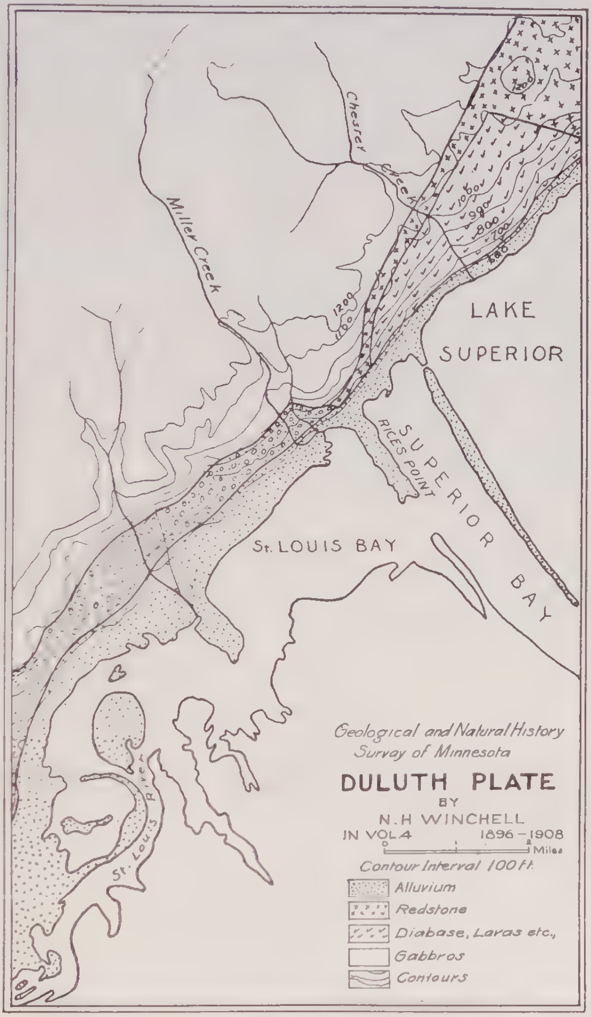

FIG. 2.

All of the area was glaciated by the great continental ice sheet which came from Canada and moved over approximately the northern half of the United States (Fig. 4). Glaciation has had an important influence upon the locality. While the hills were worn down considerably, yet deposits of a heavy red boulder-clay, or till, were laid down in isolated areas within the city limits and over rather extensive areas just outside of the city.

The water from the melting of the ice sheet did not at first recede to the present level of Lake Superior, but remained at a height of about 534 feet above the present level. At this height a beach was formed,* remnants of which can still be traced. At an elevation of about 475 feet (Fig. 5) another beach is located, indicating the fact that the lake must have remained at this level for a long period. The citizens utilize this beach as a driveway, calling it the Boulevard Drive. It extends essentially the entire length of the city. The view from it over the city and lake is a great source of pleasure to the citizens, as well as visitors to the city, who invariably are taken upon a tour of this road. A series of lesser beaches are discernible in part down to the present level of the lake. In some instances these beaches have determined the courses of the streets of the city.

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*N. H. Winchell, Geological and Natural History Survey of Minnesota, Vol. IV, 1896–1898.

It is worth while here to mention the geology of the region just back of Duluth, for this hinterland, covering a radius of 100 miles, is in large part responsible for the city's growth. The rock-mass is somewhat similar to that at Duluth, but is considerably older. In the vicinity of Hibbing, Virginia and Tower the deposits consist of Huronian and Laurentian granites primarily, with greenstones, slates and conglomerates. It is in the former igneous rocks that the world's richest known deposits of iron ore occur.*

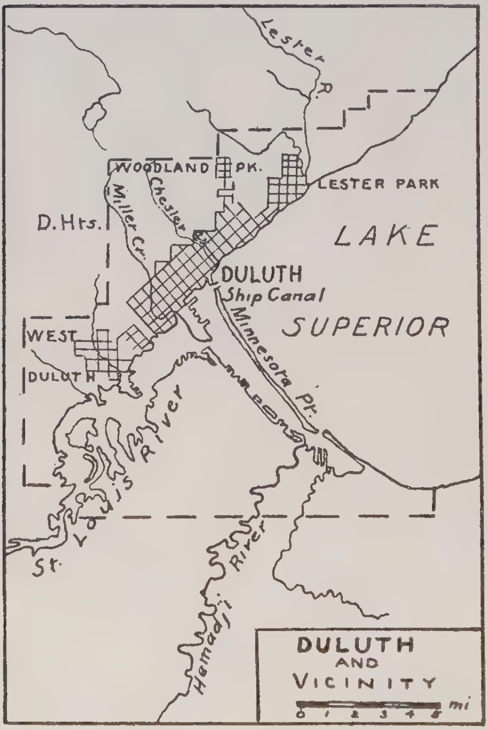

FIG. 3—Copied after Dodge's Geography, Rand McNally & Co., Chicago, slightly modified.

On the glacial till deposited in this area has grown an extensive forest that has given rise to the vast but now waning lumber industry of Northern Minnesota. Now that the forests are being removed, the possibility of the soils for agricultural production looms up as a remaining resource.

CLIMATIC CHARACTERISTICS

Temperature. Duluth is in the Intermediate or Temperate Zone. It is just about in the center of this zone, within the path of highest frequency of the continental high pressure (Highs) and low pressure (Lows) storm areas. The temperature to be expected would therefore show a considerable range, both daily and annual. Fig. 6 indicates the variation in the average temperature for the twelve months of the year. January is the coldest and July the warmest month. Spring is cooler than autumn, as shown by the relative lengths of the curves connecting the temperature of the winter months with that of the summer months and the temperature of the summer months with that of the winter months.

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* Van Hise and Leith, *U. S. G. S. Bulletin* 360, "Pre-Cambrian Geology of U. S.," Map (p. 330).

While averages are useful for some purposes, they do not always describe a situation as truly as extremes which make up those averages. Therefore, it has been deemed worth while to show the variations in the absolute extremes of temperature for the months of the years 1901-1910 inclusive* (Fig. 7). These diagrams define clearly the fact that the temperature always falls to slightly below —20° F. at least once during the winter. This low temperature may be expected in January or February. On the other hand, the highest temperature may reach 98° F. at least once during the summer months, usually in July. It should be noted that the low temperatures occur nearly always in the early hours of the morning, and that as soon as the sun rises well above the horizon the temperatures rise rapidly; hence, the citizens are rarely exposed to the lowest temperatures (Fig. 8). This is a very significant fact, because the climatic reputation which any locality may have should not be established on a basis of absolute extremes of temperature as recorded during the hours of the night, but rather upon the temperatures which any individual must endure during the working hours of the day. On this basis alone, even neglecting other climatic factors,

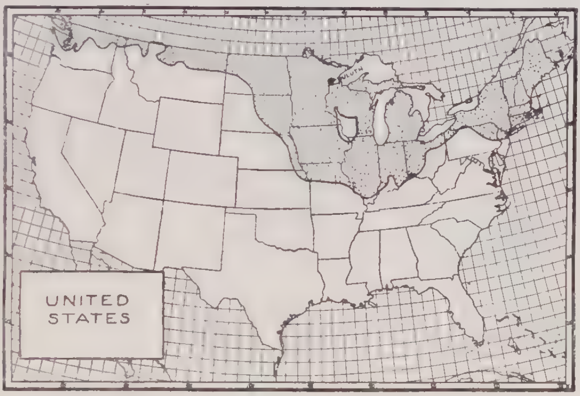

FIG. 4—Duluth and the Glacial Soils in the U. S. Sketched after map, p. 331, Vol. III, Chamberlin and Salisbury's Geology.

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* The highest temperature recorded during the past forty years is 99° F., as observed on July 1, 1883. The lowest recorded temperature for the same period is —41° F., recorded January 2, 1885.

the range of temperature in Duluth is not severe. It may be described as a range sufficient to instil briskness and vigor in the individual and to stimulate him to activities which make for progress.

The temperature extremes at Duluth are not as wide as they are at distances of 50 or 100 miles westward, because of the presence of Lake Superior. During the summer time the waters of the lake are quite cold. Winds blowing over the lake upon the land, therefore, are cooling winds. During the winter months the winds are prevailingly from land to the water; the humid air over the lake is blown away from the land, leaving the air over the land with low humidity; hence, the low temperatures cause no suffering. Although the relative humidity is rather high during the summer, the temperature is relatively low; hence, the sensible temperature is not oppressive, but quite comfortable.

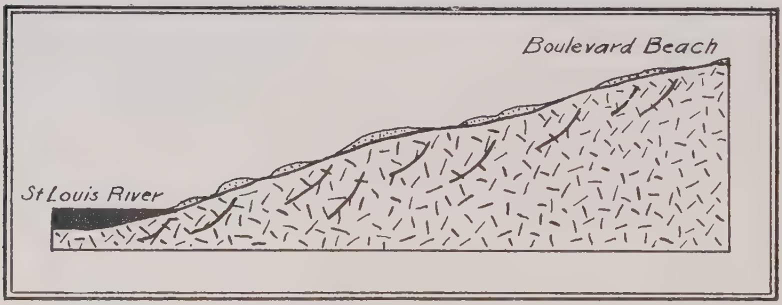

FIG. 5—Profile showing successive beach-terraces in the western part of Duluth. (Geography of Minnesota, p. 206, Hall, 1903.)

The city is built on the slope of a range that extends in a northeast-southwest direction, and rises to a height of about 500 feet above the lake level. Because of this sloping surface the angle which the sun's rays makes with it brings about temperature conditions different from those that would obtain were the surface level. The cold of the winter months is moderated and the heat of the summer is tempered.

Winds. The prevailing wind direction is northeast, the average wind velocity being about 13.5 miles per hour (Fig. 9). It is argued by some that such a wind is sufficient to cause unusual activity among the inhabitants. As one finds it necessary to walk almost daily against a moderate breeze, the resultant energy acquired soon develops into a valuable asset. A brisk breeze also maintains a constant circulation of the atmosphere, thereby preserving its freshness and purity.

Inasmuch as Lake Superior is cooler than the land throughout the entire year, the prevailing northeasterly winds insure comfortable days during the summer time. During the winter months the winds are mostly from the northwest; therefore, the presence of the cool body of water has little effect upon the temperature.

Rainfall and Humidity. The annual precipitation for Duluth equals 29.61 inches. The minimum, most of which is in the form of snow, occurs during the winter months and early spring. During the summer months, June to September, the maximum amount of rain falls. Comparing this distribution with that of temperature (Fig. 6), it may be readily observed that the variations in these two elements are parallel and nearly equal. At no season are either temperatures or rainfall excessive. The relative humidity, therefore, is not high. As a matter of fact, for the twenty years 1888-1907 inclusive it averages 75.8 per cent. It is lowest in May (69.8 per cent.) and highest in December and January (80.8 per cent. and 80.3 per cent., respectively). Given these elements of rainfall, temperature and relative humidity so normally balanced in a region with a rich soil surface, cultivation of certain hardy products on an extensive as well as intensive scale becomes possible.

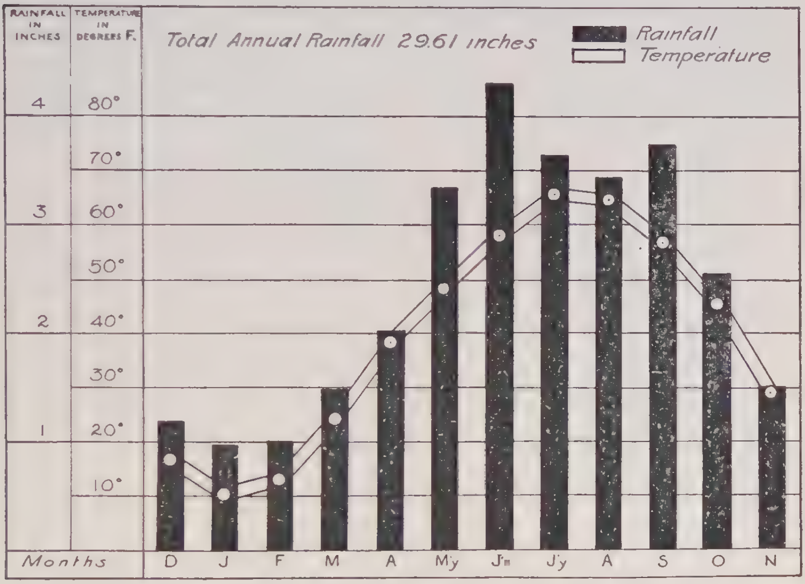

FIG. 6—Average annual rainfall and temperature for Duluth. (Data from U. S. W. B., Duluth, Minn., average for forty years.)

Snowfall. Because of the northerly latitude and occasional heavy snowstorms, Duluth is reputed to lie within a snow-bound area during the winter season. It must be remembered that although severe storms occur, they are the exception and not the rule. The snow covering, on the level ground, from November to May ranges from five to fifteen inches. During abnormal years the depth of

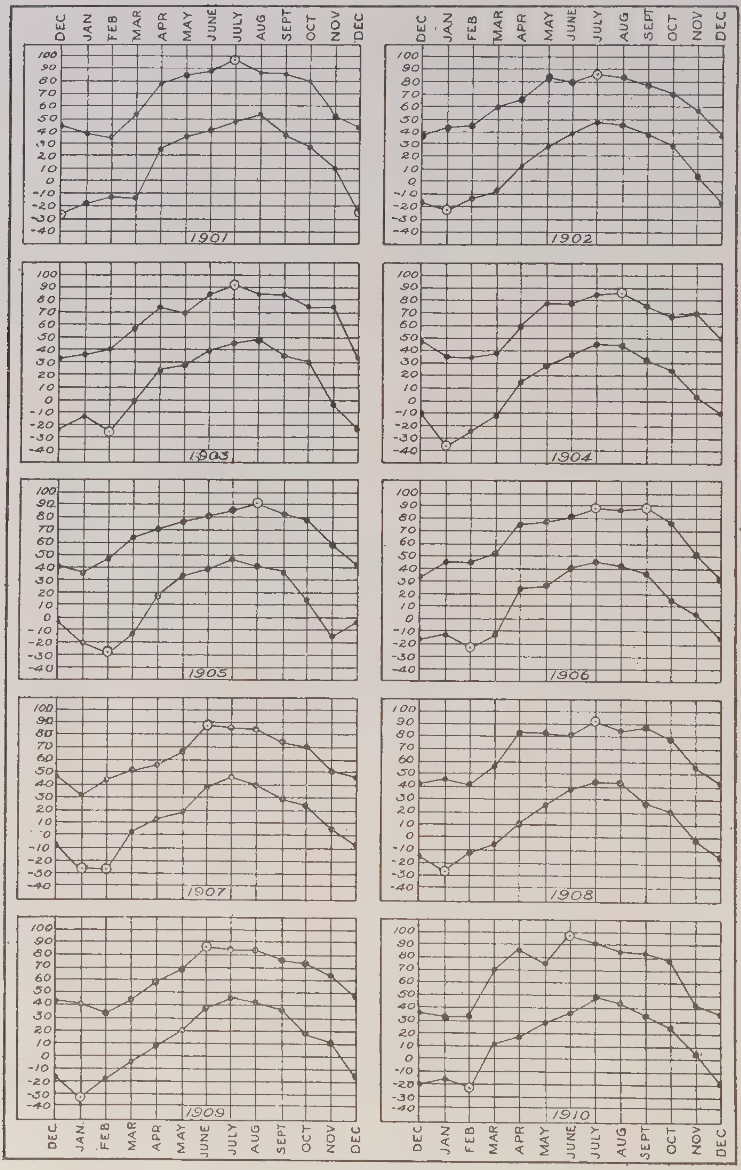

FIG. 7—Variations in absolute maximum and minimum temperatures for Duluth for years 1901–1910. (Data from U. S. W. B., Duluth.)
Upper curve=maximum temperatures.
Lower curve minimum temperatures.

snow on the level ground may exceed this range by five or ten inches; however, this condition occurs so seldom it may be considered but a minor factor. With the modern devices at hand the larger cities and the railroads connecting them are able to care for themselves very successfully during these winter seasons. Therefore cold, snowy winters, so far as concerns the land area about Duluth, are no great handicap to the city's progress.

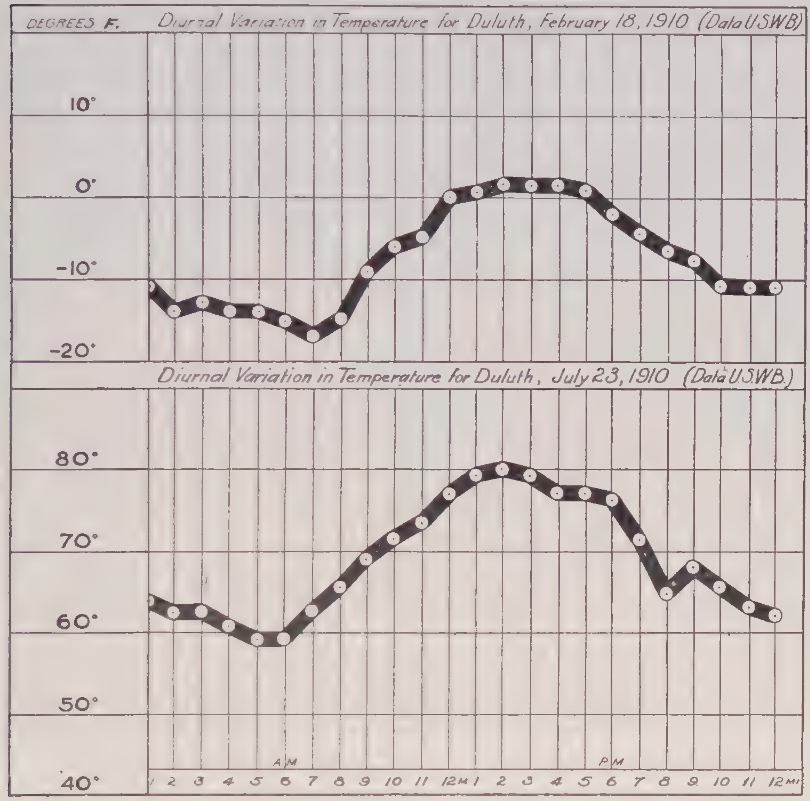

Fig. 8—Showing low temperature in the morning, rapid rise during the day and subsequent fall at night.

Climatic conditions work a hardship upon Duluth in one important respect only. Much of the growth of the city is dependent upon

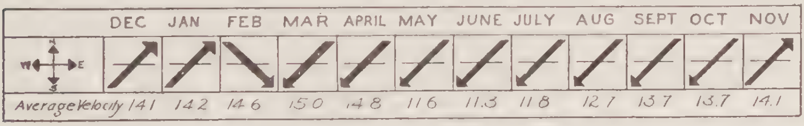

Fig. 9—Prevailing wind. (Data from U. S. W. B., Duluth, Minn., 1904–1910.)

the facilities for navigation. Although Duluth harbor is open practically the year around,* boats which must ply between Duluth and the ports on the lower lakes must close their season at the end of eight months of navigation because of the freezing of the waters at Sault Ste. Marie. Thus, Duluth is handicapped if its boats must cease intercourse during four months of the year. Looking generations ahead, it is not altogether impossible that some means will be provided to keep open the St. Mary's Canal at Sault Ste. Marie even during severe winters, thereby materially lengthening the season of navigation.

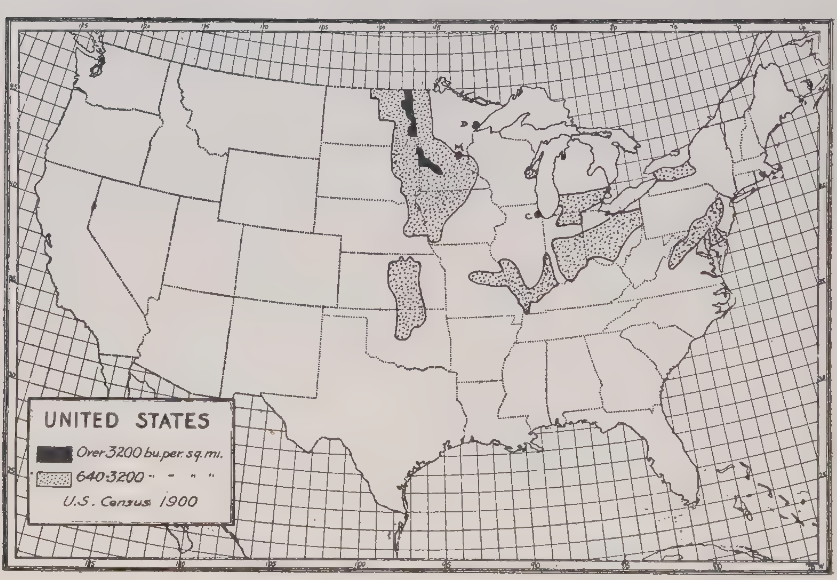

FIG. 10—Principal wheat fields in Central and Eastern U. S.

Natural Resources

The natural resources of any locality are always either a positive or a negative factor in its development. These resources may be agricultural, mineral, a combination of both, or neither one, but just facilities for collecting and distributing commodities. Duluth possesses neither of the former on a large scale. The timber that was on the site of Duluth has been a resource worth while, but its disappearance now leaves the city without any extensively developed natural product which it may claim its own. If the city is a distributing center, what does it distribute and whence come the materials?

Agricultural Products. Duluth ships large quantities of wheat, flax, barley, oats, rye, flour and lumber.* Of these commodities, probably that one which leads in Duluth commerce is wheat. The principal productive areas are shown in Fig. 10. The Red River Valley of the North, eastern North Dakota and part of eastern South Dakota ship wheat to the Eastern markets via Duluth and the Great Lakes. By far the greater amount of wheat goes to the East via Minneapolis, although Duluth is the natural geographic center for distribution of wheat to Eastern points. However, things that logically are due individuals or communities are not always secured by them. Railroad rates in many instances have been discriminatory against Duluth, resulting in the diversion of much traffic along other routes. This is an excellent illustration of the influence of artificial factors upon natural geographic conditions resulting in the destruction of the latter. Wheat, a product which should not only add materially to Duluth's welfare but be one of the principal stimuli in its growth and permanence, becomes of relatively little significance. Of the other products, none excepting lumber has held a place of unusual importance in Duluth's commerce. With the disappearance of the forests, the lumber market must disappear.

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* See discussion under The Harbor and Water Transportation.

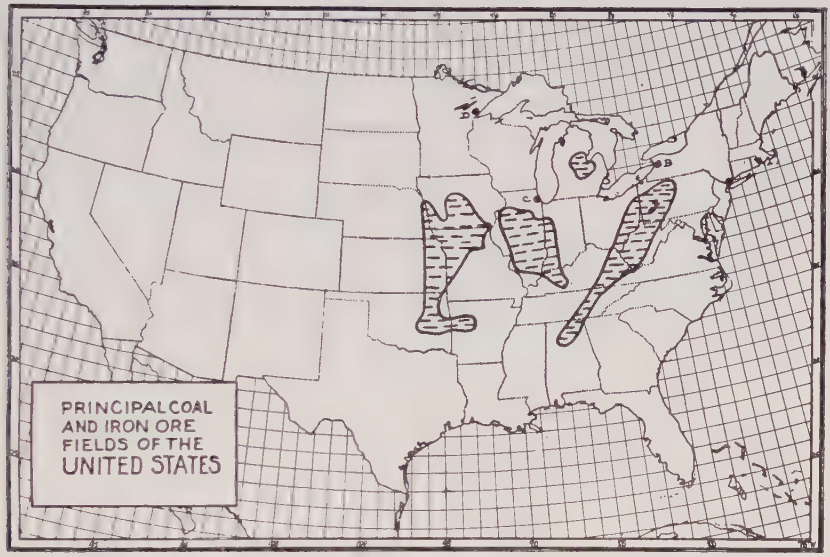

Fig. 11.

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*In 1910 the following shipments were made: Wheat, 15,091,000 bushels; Flax, 2,118,520 bushels; Oats, 1,186,547 bushels; Barley, 926,222 bushels; Rye, 121,000 bushels; Flour, 1,587,611 barrels; Lumber, 260,678 M feet, Board Measure. Marine Commerce, Duluth-Superior, 1910. G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.

A review of the entire list of the agricultural products named above makes striking the fact that the variety, as well as quantity, is small. This limitation necessitates the importation of foodstuffs in large quantities into Duluth for the use of its own citizens. Clearly, then, Duluth cannot be called an agricultural city, and its rise cannot be attributed in any way to its agricultural environment. If agricultural resources have not played a significant part in Duluth's history, then only one other material resource remains, namely, mineral.

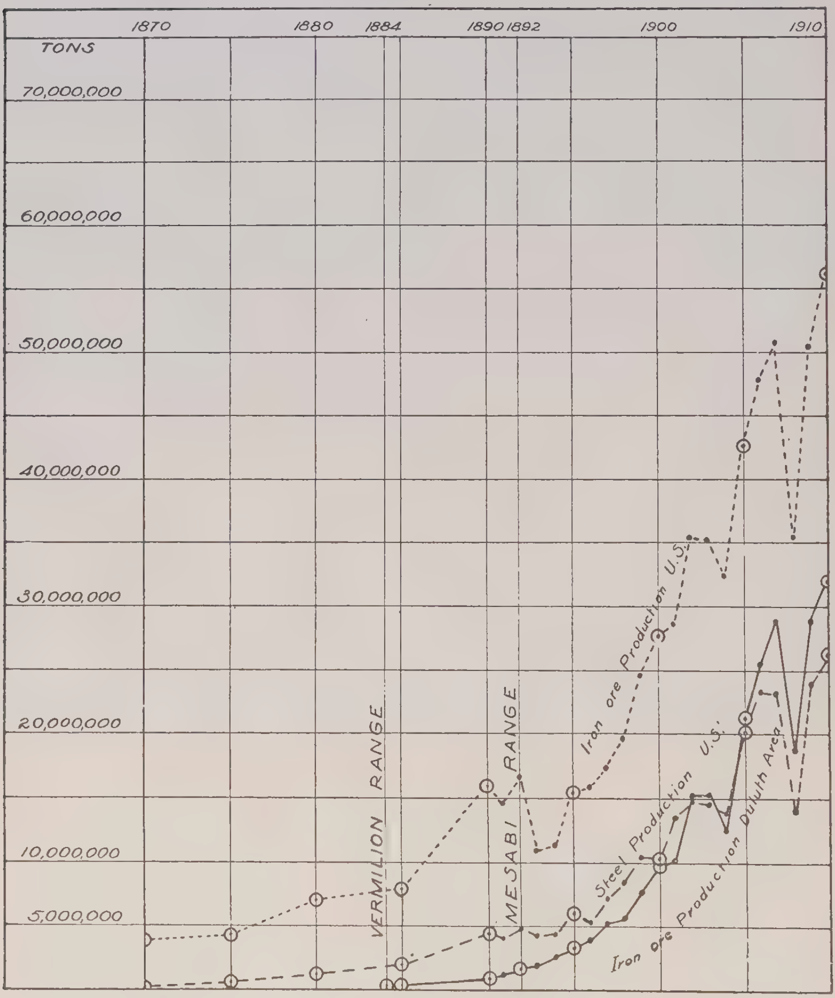

FIG. 12—From Mineral Resources U. S. G. S. Advance Chapter, 1911.

Mineral Products. Within a radius of 100 miles of Duluth is found over three-fourths of the iron ore deposits of the United States. These deposits do not occur in conjunction with coal or limestone, both of which are essential for the manufacture of iron ore into steel. The latter are found in the Pittsburg area. The iron ore can be transported by rail to the head of the Great Lakes, shipped by boat—the cheapest means of transportation—to ports on Lake Erie, and thence to Pittsburg (Figs. 1 and 11). Copper is the only other valuable metal found near Duluth; this is shipped in very small quantities.

Proofs of the significance of iron ore in the world's activities need not be dwelt upon. Suffice it to say: "Next to coal, iron is clearly the most important of the sub-surface products."* This product, fortunately, is located near a water highway that will carry it to the coal and limestone fields necessary for its manufacture. Where the ore breaks bulk—that is, is transferred from train to boats—there will necessarily rise a community of people employed to do the work of transfer. That point in this vicinity has been Duluth, and there Duluth has risen and will continue as long as the iron ore resource lasts.

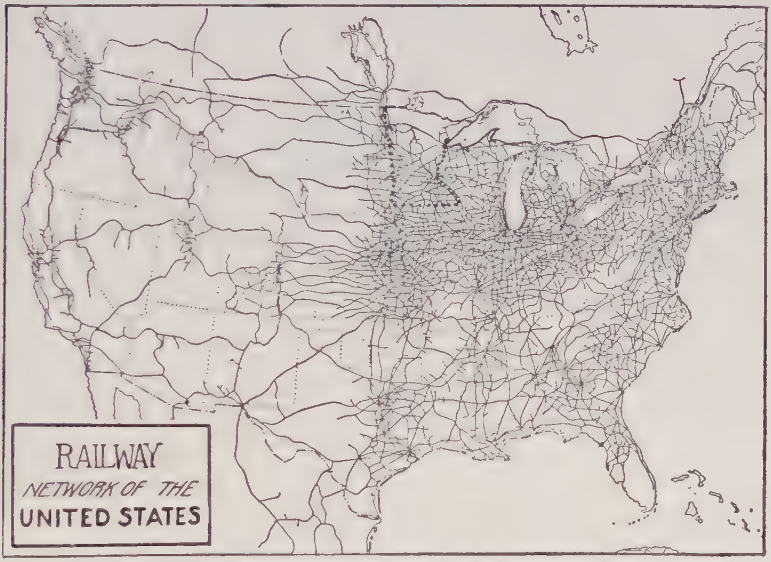

FIG. 13—Based on map in "Development of Commercial Ports" by J. Paul Goode. Chicago Harbor Commission Report.

Ore Production. How large a factor the iron ore of the Vermilion and Mesabi ranges has been in the production of iron ore and steel for the whole United States is shown in Fig. 12. The sudden fall in the curve in 1892-3 is a response to the panic of that period. In addition to that fluctuation, the very rapid rise in the curves for steel and iron ore production for the United States is notable after the opening of the mines northwest of Duluth in 1884 and 1892. Only twice after the opening of these new mines was there a decrease in ouput, namely, in 1904 and 1908. The curve for total production in the United States corresponds exactly in its fluctuations, after 1893, with the curves for the output of the Duluth ranges—an indication of how closely the total output of the United States is related to the output in the Lake Superior district. The production of steel varies essentially in the same manner.

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* Van Hise, "Conservation of Natural Resources," p. 62.

COMMERCE

The commerce of any city may consist in the exchange of only one kind of product for one from some other region, or it may include the exchange of a great variety of products. These products of exchange may be its own—that is, produced within its own property limits—or they may belong to another city, or other cities. While much of the capital which controls the mines upon the ranges is held by citizens of Duluth, Duluth cannot claim complete ownership to the mines, as a very considerable part of them are owned by Eastern capital. The variety of commodities in the commerce of any city may include largely mineral resources and only small quantities of agricultural products; or it may include agricultural products wholly to the exclusion of other commodities. A number of other combinations still are possible.

Commerce with the East. Duluth may be looked upon fairly as a point for the breaking of bulk of products passing from the Northwest to the East, and not in general as an owner or producer of the commodities shipped. It may be classified with the cities that have the balance distinctly in favor of mineral output as a dominant factor in this commerce. In return for its iron ore it receives principally coal. Coal is brought back from Eastern ports because it is lacking in Duluth and the Northwest, and is therefore of high value in this part of the country.

Commerce with the West. Because of the lack of coal resources in the Northwest, and because the boats returning from the East bring back coal, Duluth becomes the coal-distributing center for the Northwest.* Because of the cold seasons of the Northwest and the rough country, where the explorer and settler are still at work establishing civilization of the modern type, heavy clothes are essential for protection against many of the hardships which these people must still endure. In consequence, Duluth possesses an establishment which specializes in the manufacture of heavy clothing. Again, the number of retail clothing establishments is rather large in proportion to the size of the city—a direct response to the rigor of the unsettled country of the Northwest. A total of seventy-five clothing establishments gives an average of about one per 1,000 population.

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* Superior, Wisconsin, across the bay from Duluth, shares equally with Duluth in the matter of coal distribution.

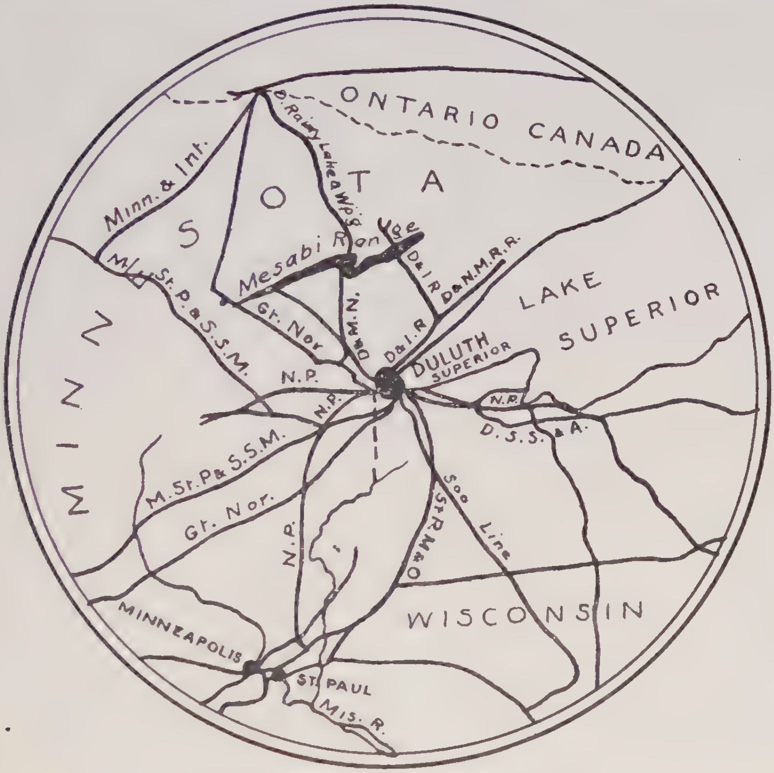

FIG. 14—Concentration of railroads about Duluth.

The jobbing of hardware is conducted by two of the largest hardware companies in the United States—a response to an agricultural country which needs implements and utensils of almost every variety, for both outdoor and indoor work.

Four large wholesale, as well as a few retail grocery establishments, distribute their products throughout the Northwest, thereby supplying the deficiency in variety of foods. The combination of soil and climate is such as to make the growing of grains the most profitable in the list of crops that might be cultivated in this region. Hence, few plant foods are especially grown for the immediate use of the inhabitants. These products of the soil they are satisfied to import from other parts of the country. The principal products included in Duluth's commerce with the West may be summarized as coal, clothing, hardware and groceries.

COMMERCIAL FACILITIES

Railroads. By virtue of its location at the head of the lakes, that is, at the head of a cheap avenue of transportation to the East, and by virtue of the geographic advantages for distribution to the West, fourteen lines of railroads radiate from Duluth (Figs. 13 and 14). Fig. 15 indicates the extent of territory which is geographically tributary to Duluth and with which Duluth is in communication. The dotted area should ship its products to Duluth for transportation to the East, because this is most economical for the shipper. Recognizing, however, the fact that trade does not

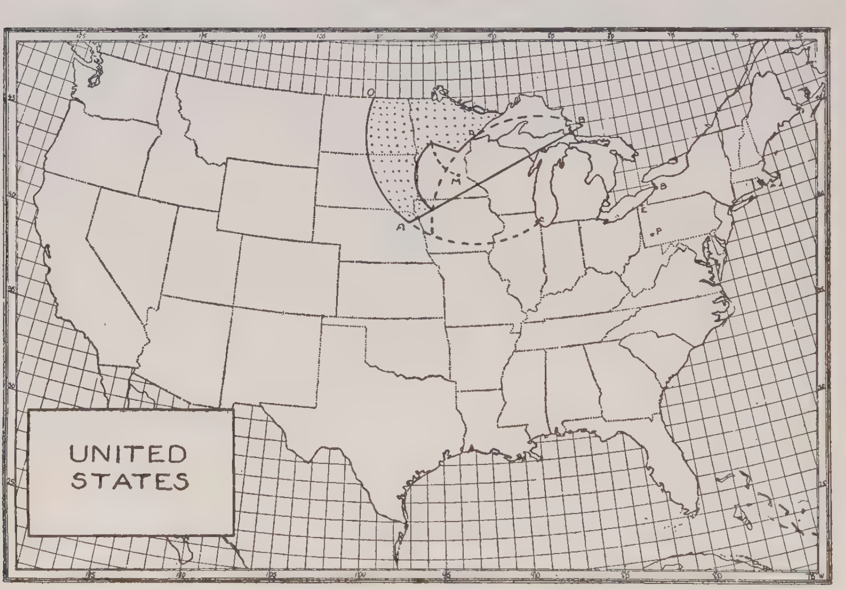

FIG. 15—North of the line A–B territory is nearer Duluth than Chicago. Dotted area is territory to which Duluth is entitled exclusively or should be on an equal competitive basis with Minneapolis and St. Paul. Territory west of curve A–O, in the Dakotas, Northern Wyoming and Montana is tributary to Duluth.

always follow geographic lines, but is often controlled in its direction by prestige of one route over another, by competition and other artificial influences, the route to the East via Minneapolis and Duluth, or Minneapolis and Chicago, may be justifiable. It has been shown* with regard to rates between the East and the Twin Cities, and also with regard to rates between points in southern North Dakota, South Dakota, southern Minnesota and Minneapolis, and between the same points and Duluth, that the railroads have adjusted their rates in a manner unfair to Duluth.†

As a result of the above conditions, Duluth, though enjoying geographically a location which seems to possess the possibilities of development into one of the world's greatest metropolitan centers, is tremendously handicapped. Until such an adjustment of artificial conditions is made which will be consistent with Duluth's natural environment its growth will necessarily be rather slow.

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* "A Memorial *in re* Rail and Lake Rates, July, 1910." The Traffic Commission of the Commercial Club of Duluth.

† Report of Hearing of Duluth Shippers before the Interstate Commerce Commission, *Duluth News-Tribune*, Nov. 23, 1911, and other unpublished data.

(*To be concluded.*)

THE ILLINOIS PETROLEUM FIELDS

BY

RAYMOND S. BLATCHLEY
Geologist in Charge of Oil Studies, Illinois State Geological Survey

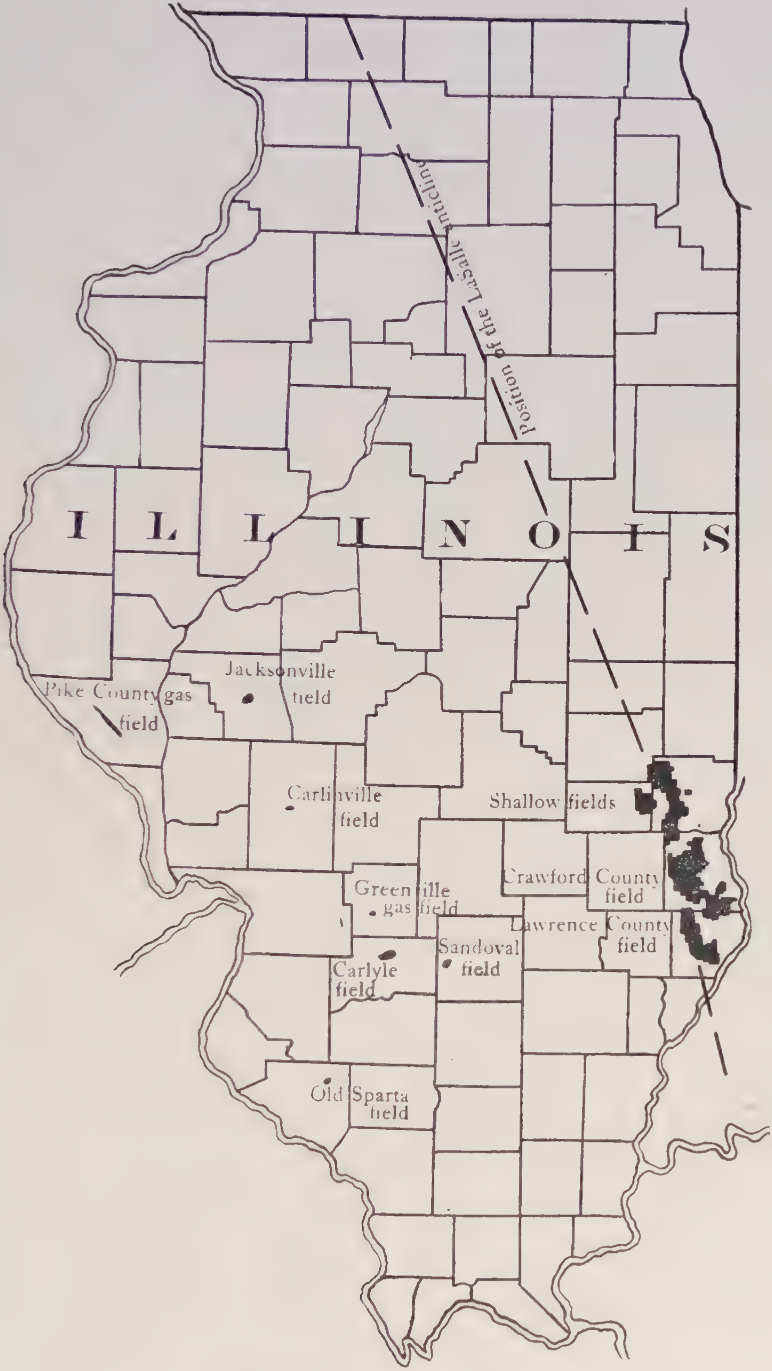
There is no more interesting chapter in the development of American oil fields than that of Illinois. Indeed, its phenomenal growth and rank are unparalleled in this country. Less than eight years ago Illinois was considered unfavorable territory for prospecting because of many unsuccessful attempts to find oil and gas and a prevalent idea that the structure of the State and its relations to the occurrence of oil and gas did not justify the presence of commercial pools. Not only were great fields of high grade petroleum found despite this feeling but also the structure and position of the pools indicate an ideal condition for the accumulation of oil and gas.

Since 1905 about 20,000 wells have been drilled in the State and 85 per cent of these have produced about 158,000,000 barrels of oil valued at $103,000,000. The present annual yield is over 30,000,000 barrels, with a valuation of about $19,000,000.

Position of the Active Fields. The main oil fields, from which most of the production comes, lie in the southeastern part of Illinois close to the Illinois-Indiana state line. They are about 165 miles directly south of Chicago and 125 miles east of St. Louis. The fields are 60 miles long and from one to eight miles wide, with an areal extent of about 250 square miles. They are not continuous but are segregated, by coincidence, into three counties, with small portions overlapping adjoining counties. They are, in order from north to south, the Clark (shallow fields), Crawford, and Lawrence county pools. The field next in importance lies three miles northwest of Carlyle, Clinton County, or about forty-five miles east of St. Louis. The field is two miles long and one mile wide, with an areal extent of two square miles. Another minor field lies one-half mile north of Sandoval, Marion County, or about sixty miles east of St. Louis. It covers about three-fourths of one square mile.

History and Present Condition of the Fields. The earliest recorded attempts to locate oil and gas in Illinois were near Casey in 1865, in the midst of the present Clark County pool. Here several wells were drilled, but the work was abandoned. Oil and gas were found, the importance of which would have been appreciated had better drilling facilities been available. Salt water drowned out the oil and prevented an earlier discovery of the present extensive fields. Between 1865 and 1900 several attempts were made to locate oil and gas. Small pools were found near Litchfield, Pittsfield, and Sparta. These are almost wholly abandoned at the present time.

The earlier drilling in Clark County prompted redrilling in the area near Casey in 1904-1905 and resulted in opening the main fields. The first wells yielded initially about thirty-five barrels of oil per day. The development spread rapidly and gradually merged into the deeper pools of Crawford and Lawrence counties until at the present time the main fields are clearly defined and with the exception of small amounts of inside drilling have ceased development. In general the depth of the wells increases consistently from the north to the south. The fields of Clark, Cumberland, Coles, and Edgar counties are called the "shallow" area because the oil usually comes from two sands at a depth of 350 to 600 feet. Such variability of depth is due to structural features of the rocks rather than



Map Showing Illinois Oil and Gas Fields.

to topographic relief, which is very slight in this section of the State.

The boundaries of the productive field in the shallow area were clearly defined in 1910 and include about 60 square miles. There has been practically no development since then and a great many of the original wells are yielding so poorly, as a result of the rapid drain of the field, that they are being plugged and abandoned. The complete abandonment of the shallow areas is not far distant. The combined daily output of the field is about 8,000 barrels, compared with 9,000 barrels in 1910. The shallow fields have been the most profitable in the State because of their depth and small cost of development and production.

The Crawford County field was opened in 1906 and is the largest of the three general pools. It covers in all about 150 square miles. The southeast end of the pool branches into a spur known as the Flat Rock and Duncanville pools. The latter produces a heavy, fuel oil. The sands of the Crawford County pools range in depth from 725 to 975 feet. There is one general sand made up of three locally parallel lenses, but there are, however, small areas where some of the lenses or even all the sands are absent. The extensive development and drain on this pool has caused a general decline of production. The average daily yield from this area in 1911 was about 18,000 barrels, as against 30,000 barrels in 1910 and 100,000 barrels in 1907.

The Lawrence County field was opened in July, 1906, and has since proven the richest producing area in the State. It is distinctive because there are seven sands from 750 to 1,900 feet deep that yield steadily about 42,000 barrels per day. In order of depth and with local names they are the Bridgeport No. 1, 2, 3 lenses, 750 to 1,000 feet; the Buchanan, 1,100 to 1,400 feet; the Kirkwood, 1,350 to 1,650 feet; the Tracey, 1,550 to 1,750 feet; and the McClosky, 1,750 to 1,900 feet. The Kirkwood and McClosky sands, especially the latter, are the richest developed in Illinois. The Lawrence County field covers about forty square miles, and within this area there has been developed a greater per cent. of large wells than in all of the other pools combined. Some of the wells reach an initial production of 2,000 barrels per day, and maintain as high as 1,000 barrels daily for several months after shooting.

With the gradual decline of operations in the main field came the desire for new pools. Wildcatting in Marion County resulted in the development of a small field near Sandoval in 1909-1910, which was clearly defined in 1911. The oil comes from a sand 1,520 to 1,600 feet deep that is the equivalent of the Kirkwood sand of Lawrence County. There are about 70 producing wells yielding 1,800 barrels per day.

An excellent field was tapped in April, 1911, about three miles northwest of Carlyle, Clinton County. The area was described and recommended by the State Geological Survey* previous to the drilling. The producing sand lies at a depth of about 1,030 feet and is thought to be the stratigraphic equivalent of the Kirkwood sand. The field is governed by an elongated dome on the western flank of the Illinois basin and includes over 125 wells, with a daily yield of about 4,500 barrels.

Production. The total amount of oil produced in Illinois previous to 1905 is negligible compared to the present annual yield. About 98 per cent. of the oil has been refined, while the remaining two per cent. has been sold for fuel. All of the Illinois oils have a paraffine base.

Up to January 1, 1912, about 19,982 wells had been drilled for oil and gas in the State, of which 3,152, or 15.7 per cent., were barren and 16,830, or 84.3 per cent., yielded the following production and value as recorded at the close of 1911:

ILLINOIS OIL PRODUCTION TO 1912

YEAR	BARRELS	VALUE
Previous to 1905	6,576	......
1905	181,084	$116,561
1906	4,397,050	3,274,818
1907	24,281,973	16,432,947
1908	33,686,238	22,649,561
1909	30,898,339	19,788,864
1910	33,143,362	19,669,383
1911 (estimated)	30,000,000	19,500,000
	156,594,622	$101,432,134

Illinois gained ninth place in production and value of oil in 1906 and third place for both in 1907. Since then the State has held third place for production and second for value and has been excelled only by California and Oklahoma. The rapid attainment of such rank among oil producing States of the Union in three years is remarkable when it is considered that other great American fields, and most of them much more extensive, required twenty or more years to attain similar positions.

There have been two declines in the brief history of the oil business in Illinois. The first came in 1909 and was due to disturbed market conditions. Recovery was prompt in 1910, but in 1911 continued decline of the early fields and the lack of new development in the later pools caused a second reversal. Unless new fields are discovered the decline must continue.

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* Blatchley, R. S., Ill. State Geol. Survey, *Bull.* No. 16, pp. 87 and 167.

Prices. All Illinois oil sold at one price varying from 60 to 83 cents per barrel from 1905 to 1907, inclusive. A grading and division in price took place in 1908. The better grades of oil have a gravity between 30° and 37° Beaume, while that of the Duncanville pool lies between 22° and 24°. The development of the Tracey and McClosky sands of Lawrence County gave still higher grades of petroleum varying from 35° to 39°. The difference of gravity necessarily caused a division of price, with the dividing line at 30°. The prevailing price now is 83 cents for oil above 30° and 73 cents for oil below that figure. The continued increase of prices is an inducement for active work in outlying districts where there is hope of finding new fields.

The Ohio Oil Company or producing agent of the Standard Oil Company developed about 40 per cent. of the Illinois fields and with purchased properties now controls 75 per cent. of the total development. This company buys and stores more than 90 per cent. of the oil of the State.

Field Efficiency. The Illinois field is one of the best equipped in the world. There has never been a field of such proportions so well cared for in such a brief period of time. Through the efforts of the Ohio Oil Company, a very efficient system of collecting oil from most of the field by gravity lines has been established. Advantage is taken of the slope of the streams along which the lines are laid after being connected with each lease. The oil flows by its own weight down the lines to a substation where it is caught and pumped back to Martinsville, Ill., and from thence overland, through three pipe lines, to Lima, O. This system has furnished a very profitable saving over the old donkey pump method. The phenomenal growth of the fields necessitated a systematic storage of surplus oil in conjunction with the pipe-line system. Tank farms with over 490 tanks, each of 35,000 barrels capacity, are conveniently located. In order to further systematize the handling of such a field, this same company maintains excellent survey, discharge, and telegraph departments which are in constant touch with the whole field. By this management less than 3 per cent of the oil is lost and that results naturally from evaporation, sediment, and leakage.

The region about the oil fields has been greatly benefited by their development. The territory first underwent a boom and for a period of several years became a frontier. The activity and rush were similar to that of a new gold strike. Old towns enlarged quickly and new ones sprang up within a very short time. The development added wealth to the community which found its way into improvement of the towns. New schools, paved streets, stores, better dwellings, etc., have taken the place of the once lethargic condition of a mediocre agricultural district. Over $20,000,000 from royalties alone and perhaps a similar amount for bonuses, labor, etc., not to speak of land valuations, have been left to the landowners.

Geology. In order that the reader may have a general view of the oil and gas conditions of the Illinois fields a brief, elementary review of the geology and origin of the oil is presented. The most conspicuous rocks over Illinois are the Pennsylvanian ("Coal Measures") series of the Carboniferous system or those characterized by coals interlain with shales, thin limestones and sands. They occupy 42,000 square miles in the heart of the State. The oil sands of Clark, Cumberland, and Crawford counties occur in this series. The shallow sands lie high in the Pennsylvanian, while the producing sand of Crawford County belongs in the top of the Pottsville rocks or basal sandstones of this series.

The lenticular Bridgeport sands and the Buchanan sand of Lawrence county belong to the Pennsylvanian. The Bridgeport sand of this county and the Robinson sand of Crawford County are considered in the same horizon, as both of them lie at the top of the massive Pottsville rocks.

The Mississippian ("Sub-Carboniferous") rocks underlie the Pennsylvanian and contain the richest sands of the State. They outcrop around the southern and western borders of the State and are thickest in the southern area, but wedge out to the north. They are penetrated about 475 feet in the main fields and include the "Gas" and Kirkwood sands in the Chester rocks at the top of the series; the Tracey sand of the Cypress or Pre-Chester rocks; and the McClosky sand of the Ste. Générieve. The latter is a soft oolitic limestone overlying a great thickness of hard limestones comprising the major portion of the Mississippian series. This limestone is the most prolific oil horizon in Illinois because of initial flow and steady yield. The Kirkwood sand is the most widespread producing horizon in Illinois. It is correlated with the Carlyle sand of Clinton County, the Benoist sand of the Sandoval field, Marion County, the Sparta sand of Randolph County, and the Oakland City sand of Pike County, Indiana.

General Structure of the State, A number of cross-sections* across Illinois, compiled from well borings and mines, indicate that the central and southern portion of the State lies within a great spoon-shaped basin with its long axis extending from the Wisconsin State line in Stephenson County past LaSalle, Cerro Gordo, Lovington, Olney and into the deepest part of the basin in Wayne, Hamilton, Edwards, and White counties. Towards this basin, with local exceptions, all the rocks of Illinois and of western Indiana dip gently. The rocks on the eastern side of the basin rise rapidly into a conspicuous fold known as the LaSalle anticline, decline gently and then rise again into Indiana. The anticline is exposed in river bluffs near LaSalle and passes from thence in a southeastward direction to Sadorous in Champaign County, past Tuscola and enters the main oil fields of Clark County near Westfield. It continues in a direct line through the oil fields and apparently crosses the Wabash and continues to Princeton, Indiana. The western side of the basin is very gentle and is occasionally interrupted by small deformations such as terraces or domes, along which pools of oil or gas have accumulated.

Probable Origin of Illinois Oil. During the deposition of the sedimentary rocks in the Illinois basin a great abundance of plant life, both marine and land, was laid down with the muds and silts of the accumulating deposits of centuries. These, with possibly some marine animal life, were shut off from the oxygen of the air and other destructive agents and were trapped within the shale deposits, where eventually, through the lapse of geologic time, a peculiar, slow distillation took place, wherein the protoplasm, carbon, and other constituents of the once living matter were converted into oils and gases. The distillation was a matter of ages and its subsequent migration from the shales or limestones to more porous reservoirs by means of capillarity, gravity, and gas or rock pressure was accomplished in additional periods of time. It is thought that the natural distillation of the petroleum and a great portion of its migration to the sands took place while the beds lay horizontal or practically so. There was subsequent folding of the strata which formed the extensive LaSalle anticline along the eastern side and the wrinkling into terraces and domes along the broad, gentle western slope of the Illinois basin. When these disturbances occurred the water, petroleum, and gas within the sandstones were forced to move according to their specific gravities. The water sought the basin, while the oil and gas were displaced and forced into the crest of the LaSalle fold on the east and into the small irregular domes and terraces on the west.

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*Loc. cit., Plates 7 to 11.

It is thought that those oils that have small per cent. of sulphur and are sweet smelling originated from the plant life of the shales, while the oils of large sulphur content and very rank odors came from marine animal life of the limestones. The former oils are found in pure sands, while the latter come from limestones or highly calcareous sandstones.

Results of Geologic Investigation. An investigation of the geological conditions of the main fields was recently made with a view of determining the cause of the accumulation of oil and gas and the relation of the quantities of oil, gas, salt water, porosity of the sand, etc., to the structural features of the sand. The work was based upon the elevations and records of 5,200 wells in the southern half of Crawford and the whole of Lawrence counties.

The Illinois basin and the lower flanks of the LaSalle anticline yield abundant water in all of the productive sands of the main fields. The western limits of the fields are clearly defined and beyond this line the sands are wholly water-bearing, while over the fold most of the sands are oil or gas bearing. It is obvious from the position of the water and oil along the LaSalle anticline that the water has controlled the accumulation of oil in the fold. The water probably has originally permitted the oil to migrate long distances up the slope of the Illinois basin into the arch.

The accumulation of oil and gas in their present position may be looked upon as ideal and is presumably due to the following factors:

1. There is an extensive anticline, with a marked basin on at least one side.

2. The depressions on both sides of the fold, showing abundant water, comprise extensive "feeding" areas for the accumulation of oil in the arch.

3. The sands are commonly porous and hence form suitable reservoirs.

4. There are abundant shales and some limestones overlying the sandstones, which probably serve as impervious covers to the reservoirs.

5. The sands in both limbs of the anticline are abundantly saturated with salt water, which is probably instrumental, by difference in gravity, in holding the oil and gas captive in its present position.

6. Although the general structure of the oil fields is dominated

by a major fold its crest is very irregular and is interrupted by numerous minor domes and transverse depressions, which, together with irregularities of porosity, have been instrumental in segregating the pools.

7. With one exception the best collection of oil was found over the broad flat areas. The domes over the entire field are logical gas reservoirs; but, contrary to expectation, the largest amounts of gas and oil do not lie at the apexes of the domes but a short distance below.

Natural Gas. Illinois produces small amounts of natural gas in proportion to her immense quantities of petroleum. Her present annual yield has a value of about $600,000 and a rank of eighth among gas producing states. The total value of gas produced in Illinois from 1885 to 1911 is about $2,649,000. The principal gas areas of the State lie within the main fields near Bellair and Hardinville, Crawford County, and north of Bridgeport, Lawrence County. The gas comes from raised portions of the oil horizon. Many of the oil wells produce small quantities of gas which is used, chiefly, for field operations. There are about forty gas wells that supply towns within or close to the oil fields. Gas is found in less commercial quantities at other points in the State, such as Sandoval, Greenville, Carlyle, Carlinville and Jacksonville.

THE TRANSCONTINENTAL EXCURSION OF THE AMERICAN GEOGRAPHICAL SOCIETY

As the *Bulletin* has already announced, the American Geographical Society of New York celebrates this year the sixtieth anniversary of its founding and the occupation of its new building on Broadway at 156th Street. No form of celebration seemed so fitting as an excursion across the United States, in which an invited party of European geographers should make the journey in company with a number of American geographers, who would show the visitors the most significant of our geographical features, the excursion to be closed by a meeting in New York, when the visitors should be invited to give some account of what they had seen.

The plan thus outlined is now approaching its realization. The leading geographical societies of over a dozen European countries were requested to select from among their members a number of proficient geographers whom the American Geographical Society might welcome on the excursion.

The sixteen societies which selected the European participants in the Excursion are: k.k. Geographische Gesellschaft Vienna, Austria; Société Royale de Géographie d'Anvers, Belgium; Société Royale Belge de Géographie, Brussels, Belgium; Kongelige Danske Geografiske Selskab, Copenhagen, Denmark; Société de Géographie, Paris, France; Gesellschaft für Erdkunde, Berlin, Germany; Royal Geographical Society, London, Great Britain; Magyar Földrajzi Társaság (Hungarian Geographical Society), Budapest, Hungary; Società Geografica Italiana, Rome, Italy; Koninklijk Nederlandsch Aardrijkskundig Genootschap, Amsterdam, The Netherlands; Norske Geografiske Selskab, Christiania, Norway; Sociedade de Geographia, Lisbon, Portugal; Imperatorskoye Russkoye Geograficheskoye Obshchestvo, St. Petersburg, Russia; Real Sociedad Geográfica, Madrid, Spain; Svenska Sällskapet för Antropologi och Geografi, Stockholm, Sweden; Geographische Gesellschaft, Bern, Switzerland. The list thus constituted, with the addition of a few names otherwise invited, now includes over forty geographers from sixteen different countries, most of the delegates being professors in universities or officers of national geographical societies. It is safe to say that no such gathering of geographers has ever been brought from Europe to America.

The Americans already enlisted, either as round-trip or as temporary members, include, among professors of geography, Barrows and Cowles of Chicago University, Brigham of Colgate, Bowman of Yale, Davis and Ward of Harvard, Dodge and Johnson of Columbia, Fenneman of Cincinnati, Jefferson of Ypsilanti, and Martin and Whitbeck of Wisconsin, as well as a number of scientists from various parts of the country representing subjects allied to geography. Prof. W. M. Davis of Harvard University is Director of the excursion. Thus the party as now made up includes over fifty round-trip members and some twenty or more temporary members.

The number of participants is still to be somewhat enlarged, and correspondence (addressed to the Director, Transcontinental Excursion, American Geographical Society, Broadway at 156th Street, New York) is therefore invited from proficient geographers (men only) who may desire to take part in the excursion for longer or shorter periods, and who can aid the American members already enlisted in explaining our geographical features to the European members. Place on the special train in which the excursion will be made cannot be promised to all applicants, but it is hoped that all professional geographers who wish to take part in the excursion can be accommodated in one or another part of the route.

The excursion train will leave New York about Aug. 22 and return in the early part of October. The route of the excursion includes Niagara, Detroit, Chicago, Madison, St. Paul-Minneapolis—probably Duluth and the Iron region—the Yellowstone Park, Spokane, Seattle, Tacoma, Portland—probably San Francisco, possibly the Yosemite Valley—Salt Lake City, Grand Junction, Denver, Albuquerque, the Grand Canyon of the Colorado in Northern Arizona, Kansas City, St. Louis—possibly Memphis, Birmingham and Chattanooga—Washington and New York. Numerous stops will be made at points of geographical interest on the way.

A most generous hospitality is promised at many places, where the party will be entertained in local clubs and taken about in automobiles. The cities of the Far Northwest are particularly active. They are planning to take the excursionists up Mt. Rainier, through the superb forest that clothes the lower slopes of this great volcano, to the hotel situated near the timberline, whence the glaciers of the higher slopes may be seen; and also to Crater Lake, the waters of which occupy a huge cavity of engulfment in a once lofty volcano, one of the most remarkable features of the West, although as yet not widely known. Two days will be spent in Washington, where visits will be made to various scientific bureaus of the Government.

The final meeting in New York will be made the occasion of a more general invitation than can be given for a limited excursion on a railway train; and at that time it is desired that the European geographers should have opportunity of meeting a large number of their American colleagues. Due announcement will be made of the place and date of this final meeting, as well as of the speakers and the subjects that they will treat.

DEATH OF GEORGE BORUP

Revised Plans of the Crocker Land Expedition

George Borup, one of the leaders of the Crocker Land Expedition, which was expected to sail from Sydney, N. S., on July 20, 1912, and also assistant Curator of Geology in the American Museum of Natural History, was accidentally drowned on the afternoon of Sunday, April 28, near Crescent Beach, Conn., by the capsizing of a canoe. His friend Samuel W. Case of Norwich, Conn., shared his fate.

Borup was only twenty-seven years old and his loss is lamentable from all points of view. The blow came only three weeks after the great meeting in the Museum lecture hall, where a large and distinguished company assembled to bid Godspeed to the new expedition that was soon to start for Grinnell Land. Young as he was, Borup had won the respect, confidence and affection of all with whom he had been associated whether in the Arctic with Peary, at Yale, preparing for a scientific career, or in the discharge of his new duties at the American Museum of Natural History and in the preparation for the early sailing of the Crocker Land Expedition.

It was his ambition to devote his life to science and to scientific exploration. He seemed to possess every quality essential for the career he had marked out for himself; and the sad accident that took him off cut short, on the threshold of its activity, a life that bid fair to be one of great usefulness and achievement.

Young Borup was the son of Lieutenant Colonel H. D. Borup, U. S. A., retired. He was graduated from Yale University in 1907 and then entered the mechanical department of the Pennsylvania Railroad at Altoona. He had, however, a great yearning for travel and exploration and at length he induced Commander Peary to give him a place as assistant on the North Polar Expedition of 1908-1909, during which Peary attained the Pole. On this expedition very responsible service was entrusted to Borup, who proved equal to every duty that devolved upon him.

After his return home the officials of the American Museum of Natural History, who had become much interested in Borup's scientific ambition and qualities, formulated a line of work and study for him to pursue, He first spent the field season of 1910 in topographic surveying with a party of the U. S. Geological Survey; then he returned to Yale, where the professors in the department of geology designated the branches of study he should pursue and were greatly interested in the rapid progress he made. He applied himself with the utmost diligence and his sturdy character and fine mentality were shown in his work.

During the vacation of 1911, Borup spent part of the time in the college geological camp among the mountains of Virginia and later he worked in the Museum as an assistant in the department of geology and invertebrate palæontology. Last fall "Professor Gregory of Yale was so favorably impressed with the progress being made by the young enthusiast that he warmly endorsed him for the scientific leadership of an expedition to the far north to verify the existence of Peary's Crocker Land and to do scientific work along many lines—a great enterprise in which he was to share credit equally with Donald B. MacMillan, another of Rear-Admiral Peary's trusted assistants in 1908-1909."

The Council of the American Geographical Society on May 16, 1912, adopted the following minute on the death of Mr. Borup:

> "The sudden and untimely death of George Borup cut short a career that gave promise of much usefulness in the fields of exploration and geographical science. Young and modest as he was, his physical vigor, his determined spirit, his ambition to excel, had already stood the severe test of Polar exploration; and his love of science, his gift of imagination so essential in all search for new truth, together with his determination to devote his life to the broader, more modern and useful concepts of geography, and his association with the American Museum of Natural History and the great opportunities it affords, all contribute to make his untimely end, on the eve of an important and promising exploration, a cause of the deepest regret to this Society.
>
> *Resolved,* that the Council of the American Geographical Society orders that the above minute be spread upon its records and that a copy be forwarded to Mr. Borup's family with the expression of this Council's sympathy in their sorrow."

REVISED PLANS FOR THE CROCKER LAND EXPEDITION

Dr. E. O. Hovey and Mr. H. L. Bridgman, the Committee in charge of preparations for the expedition, have sent a circular letter to the subscribers to the fund announcing the changes that it has been necessary to make in the plans of the Crocker Land party.

The letter says that the Crocker Land Expedition which was to have gone north this summer under the leadership of George Borup and D. B. MacMillan has been postponed to the summer of 1913, on account of the death of Mr. Borup and the impracticibility of finding a satisfactory substitute for him in the short time remaining before the expedition was to start.

The Honorary Committee, consisting of President Henry Fairfield Osborn, Mr. Chandler Robbins, General Thomas H. Hubbard and Dr. Walter B. James; and the Committee in Charge, consisting of Dr. E. O. Hovey and Mr. H. L. Bridgman, have begun preparations for the reorganization of the expedition along such lines as circumstances may necessitate, without changing the main objects of the enterprise, as set forth in the Prospectus issued in January, 1912.

Colonel Borup and a number of the principal supporters of the expedition have united in the formation of a new plan. The expedition will be a memorial to George Borup, the young explorer who was so keenly interested in it and who was the mainspring of its present undertaking.

Mr. MacMillan's connection with the enterprise continues as heretofore and he is utilizing the intervening time for the purpose of making additional preparation for the scientific work of the expedition.

Most of the supplies and equipment for the expedition had been ordered. Some of the orders could be and were cancelled, but the preparation of much of the material was already so far advanced that it could not be stopped. The prepared material will not deteriorate, however, and it has been put into safe storage for use next year, while the special apparatus is being assembled at the Museum. The unexpended balance of the subscriptions already paid in has been deposited in a special interest-bearing account with the United States Trust Co. of New York, where the income will be added to the principal.

As originally planned, the expedition called for $52,000 to meet its requirements, but the expense of cancelling the steamship and other contracts, of storing supplies for a year, and of changing the personnel of the party will unavoidably somewhat increase the cost of the expedition. The subscriptions already made total about $30,000, so that the starting of the expedition is assured, though more money is needed for its full success.

CORRESPONDENCE

CLIMATIC CHANGES IN THE NEARER EAST

To the American Geographical Society:

In his "Palestine and its Transformation," Professor Ellsworth Huntington has applied to the lands of the Nearer East his theories of the pulsatory nature of climatic changes and of their relation to history. In so far as by this he means merely the general influence exerted, through long generations, on a particular race settled in a particular country, no historian would disagree with him.* But when he insists that particular facts of history, and those among the most important, are directly the result of climate, it is necessary that the historian should check his claims by the facts themselves.† Professor Huntington frankly recognizes that Palestine and "the surrounding regions furnish perhaps the best of all keys to the climatic history of the whole ancient world,"‡ and that "the accuracy with which its history is known . . . makes it a standard by which to test conclusions as to regions whose history is less well known."§ We accordingly have a right to demand that the history of Palestine and Syria "should present a close correspondence between climatic fluctuations on the one hand, and economic, social, and political events on the other."‖

It will be our purpose, in the present study, to give in his own words Professor Huntington's explanations for certain facts of history, and then to confront these explanations by the facts in the case. We begin with one of his favorite statements, that there was a "great route, now all unused, [which] led eastward from Egypt across the midst of the desert to Babylonia and the Persian Gulf,"¶ and that "earlier we find a suggestion of similar conditions in Babylonian and Egyptian accounts of the passage of trade and armies across regions now desert."** Yet Professor Huntington cannot point to one single passage in the overwhelming mass of material from the ancient Orient in which we have a reference to such a route. It is true that earlier scholars assumed such a route, but there is no evidence, and a perusal of the actual inscriptions from which Professor Huntington's accounts have ultimately come will show that this is unjustified. For example, he tells us that "King Lugalzaggisi . . . expanded his rule across the desert to Syria . . . It is hardly probable . . . that conquests could have been carried from the mouth of the Euphrates to the Mediterranean in those early days, unless the crossing of the desert were much easier than at present."†† Lugalzaggisi simply lists his conquests, of routes he says not a word, and in all probability his conquests were in Babylonia itself. Professor Huntington believes that it would have been impossible for Sargon the elder to have invaded "distant Syria . . . if then, as now, the desert had been full of plunderers, and the road through Palmyra had been the most southerly that an army could traverse."‡‡ We know of these exploits only from late omen texts, which barely mention the conquest of Amurru, and the crossing of the sea of the setting sun (the Mediterranean). Amurru *may* be north Syria, though at this time it is probably rather to be found on the middle Euphrates, and an earlier version recently discovered gives instead the sea of the rising sun, the Persian Gulf. Aside from this question as to where the expedition really went, we should note that there is not a word as to route.

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* Cf. Olmstead, *Journal of Geography*, X, 163ff.

† I wish to acknowledge the inspiration, secured long ago from Professor G. L. Burr of Cornell University, which led me to an interest in this branch of study, as well as to active help from my colleagues in the University of Missouri, Dr. F. V. Emerson of the Department of Geography, and Mr. J. E. Wrench, my companion on both of the Cornell expeditions to the Orient.

‡ Palestine, 250. § Ib. 251. ‖ Ib. ¶ Ib. 30; cf. 159. ** Ib. 375. †† Ib. 380f. ‡‡ Ib. 381.

Part of Gudea's material, we are told, "came by land across regions where to-day caravans hasten timidly in fear of plundering Bedouin, or do not travel at all for lack of water," and this proves "how peaceful and easily traversed [was] the desert four and a half millenniums ago."[*] Gudea again simply lists the places from which he secured material for his buildings. There are no topographical indications in the inscriptions, and scholars differ widely as to their identification, though there is a growing tendency to place most of them in or near Babylonia. Meluhha seems to be near the Arabian desert, but this comes close to the gates of his city, and the material from thence need not have been carried far. At any rate, we have nothing approaching proof of such a route. We are told that, in the Kashshite period, "we know . . . that Egypt, Syria, and Babylonia were united by trade of the briskest description across regions which now are desert," and that, with the Aramaean invasion, "between Egypt and Babylonia trade disappeared completely. No caravan could possibly withstand the raids which the hungry desert folk made throughout Arabia."[†] For the former period, we have a mass of information in the Amarna letters, but there is no reference to any route going south of that by the Euphrates, and there is as little evidence for the second statement.

"The great armies which crossed the desert apparently did not follow the roundabout route through Palmyra or Aleppo, as all modern caravans do."[‡] In those cases where we have a detailed enough account to permit exact topography, we regularly have the Aleppo route taken, examples of which are the expeditions of Thothmes I, Thothmes III, Tiglath Pileser I, Ashur nasir apal, Shalmaneser III, Tiglath Pileser IV, Sargon. Esarhaddon and Ashur bani apal, or rather detachments of their troops, did cross the extreme northern part of the desert, but it is perfectly clear that it was not crossed south of Damascus, the goal of the trip. But the language used by the Assyrian scribes clearly shows that this was an extraordinary expedition through a "land of hunger and thirst." So far from the evidence pointing to the prisoners from Israel (sic) being carried to Babylonia "apparently across the desert,"[§] the fact that Zedekiah of Judah was taken to Nebuchadnezzar when he was encamped at Riblah in North Syria[‖] proves that the Babylonians used the Aleppo route.

"In 674 B. C., Esarhaddon . . . led an army from the Euphrates River across the whole desert of Arabia to the remote south. By reason of the absolute absence of water in vast areas, such a march would to-day be utterly impossible."[¶] "A little later Esarhaddon conquered Egypt and penetrated to the extreme south of Arabia, where he defeated the Mineans. Such extensive conquests would be impossible unless the desert was easily passable. They furnish strong evidence that remote parts of Arabia were more accessible than now."[**] As an actual fact, this expedition was connected with the return march from Egypt, and the references to Rapihi or Raphia, where is now the present Turko-Egyptian boundary, and to the stream bed of Musur, the "river" of Egypt of the

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[*] Ib. 382f.
[†] Ib. 390.
[‡] Ib. 272.
[§] Ib. 273.
[‖] II Kings, 25, 20.
[¶] Palestine, 375.
[**] Ib. 400.

Old Testament and the modern Wady el Arish, where is now the first Egyptian outpost, show plainly that it took place not far from the modern route from Gaza to Pelusium. But, so far as we can make out from the mutilated fragments,[*] even that part of Arabia was far from being "much more accessible than now." In connection with this so-called "river," we are expressly told that this was "a region where was no river"; the water used by the expedition came from wells and had to be drunk from pails; there is mention of "all the camels of the king of Arabia," and though what they did is lost in a break, we are justified in comparing the hiring of camels from the king of the Arabs by Cambyses, in order to have them bring water for the march of his soldiers through this very "dry desert without a drop of water on their way to Egypt."[†] Furthermore, we hear of stones, of double-headed serpents, and of a region so difficult that it was necessary for the god Marduk himself to come to the help of the king and to infuse new life into the soldiers.

"In the middle of the seventh century, just after Esarhaddon's great conquests," was an outpouring of the tribes, and we are informed that "as early as 660 a slight advance of Indo-Germanic tribes from the dry region to the north began to trouble Assyria." Naturally, all the events up to the Persian conquest are ascribed to a change for the worse in the climate.[‡] Unfortunately for the theory, we happen to have for this very period a very definite statement as to the climate. To quote Ashur bani apal himself, "When upon the throne of my father, my begetter [Esarhaddon], I sat, Adad [the god of the atmosphere] poured out his rain storms, Ea [the god of the deep] opened [his springs], the forests grew mightily, the canes grew up in the thickets, so that no one could enter." Then we are informed of the great increase of the lions which inhabited these thickets.[§] If somewhat later in the same reign we find mention of a famine in Elam,[‖] this simply proves that the Assyrians had good years and bad, even as we in America. One passage no more proves that conditions were worse then than does the other that they were better.

"Almost every modern traveller has much to say of the hardships of travel in Sinai, and of the impossibility of its supporting multitudes of people. The ancient writers say almost nothing of this. We can scarcely suppose that they were fools or knaves, and therefore we must believe that they described things approximately as they were."[¶] What the ancient writers do say may be gathered from the following extracts from the Old Testament: "Ye have brought us forth into this wilderness to kill this whole assembly with hunger";[**] water fails for the people to drink;[††] the people complain that there is no food but manna;[‡‡] there is danger that it will be reported that the Lord has killed Israel in the wilderness;[§§] the people complain that "this evil place . . . is no place of seed or of figs or of vines or of pomegranates, neither is there any water to drink,"[‖‖] the more striking as our party found figs at one place in the desert, and Professor Huntington himself speaks of the "one or two grape vines which the officials had nursed through the droughts" of a very bad year;[¶¶] the fear that the people may "die in the wilderness for there is no bread and there is no water";[***] the "great and terrible wilderness wherein were fiery serpents and scorpions and thirsty ground where was no water,"[†††] which sounds almost like an echo of the Assyrian accounts;[*] or the very significant statement in the early Blessing of Moses, "He found him [Jacob] in a desert land and in the waste howling wilderness."[†] If more proof is needed, we have only to turn to the Egyptian inscriptions to see that there were only Bedawin tribes in the Sinaitic peninsula in their time, that even the very valuable mines at Wadi Maghara and Sarbut el Khadem were not regularly occupied, but were visited by expeditions of such difficulty that the trip was sometimes, at least, made by water, and "a wearisome desert journey in Sinai was thus avoided."[‡] It was cause for special congratulation when the "youths returned in full quota, all of them. There was none that fell among them."[§] Another caravan leader speaks of "traversing inaccessible valleys, bringing unknown extremities of the world."[||] Perhaps the best commentary on Professor Huntington's statement may be seen in the word of the official who writes: "I arrived in this land in the third month of the second season, although it was not the season for going to this mineland . . . When I came from Egypt, my face flinched, and it was hard for me. The highlands are hot in summer and the mountains brand the skin . . . this evil summer season."[¶] The weather conditions which could have thus afflicted an Egyptian accustomed to the blazing summer sun of Egypt must have caused the unfortunates who were compelled to travel there to say much of the "hardships of travel in Sinai."

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[*] The best edition and discussion in H. Winckler, "Untersuchungen zur Altorientalischen Geschichte," 98.

[†] Herodotus, iii. 9.

[‡] Palestine, 401 f.

[§] S. A. Smith, "Keilschrifttexte Asurbanipals," II. 2.24 ff.

[‖] Cylinder B. IV. 17 ff.

[¶] Palestine, 272.

[**] Exod. 16, 3.

[††] Ib. 17, 1.

[‡‡] Num. 11, 4 ff.

[§§] Ib. 14, 16.

[‖‖] Num. 20, 5.

[¶¶] Palestine, 125.

[***] Num. 21, 5.

[†††] Deut. 8, 15.

In the study of Hebrew history, Professor Huntington seems hampered by an unconscious apologetic tendency, if we compare his reference to a "certain school of critics who hold that the Biblical authors indulged in undue hyperbole," and his statement that "if the theory [of pulsatory changes] be accepted, a large number of narratives which now seem improbable become reasonable."[**] It would appear to be due to this that he accepts the numbers of the Exodus, as well as the general fact of such an event, considers that the data in regard to population given by Deuteronomy are at worst only exaggerated, and even can believe in the accuracy of the census of David. An equally distorted perspective seems indicated by his belief that the kingdom "founded by Saul and extended by David" and brought to its height by Solomon "must have been a time when tribes of the desert were at peace by reason of abundant water and forage."[††] This exactly reverses things, for the success of David is the success of the half nomadic and more than half uncivilized Judah against the better civilized Philistines and Phœnicians, as well as the somewhat more advanced tribes of North Israel. According to Professor Huntington's own theory, this should rather prove that it was a time of distress, forcing out in layer after layer against the settled folk those tribes nearest the desert, and this might be confirmed by the fact that the great kingdoms of Assyria and Egypt have a time of eclipse at this very period.

"The apparent populousness of Palestine, and we may add of Greece, points to" the conclusion that there was a "general prevalence of relatively moist climatic conditions previous to the Christian era."[‡‡] But, as Grundy has so well pointed out,[§§] from at least the sixth century onward, Greece did not produce enough food to support the population, and accordingly the great economic necessity behind so much of the political history was the control of the grain trade from the Euxine. A large population in Greece, therefore, merely proves that South Russia at this time produced enough grain for export and proves nothing as to the fertility of Greece itself. That population decreased alarmingly after the age of Alexander and continued to decrease until long after the Christian era. But we no more need to call in climatic causes to explain this than do we for the conditions which have caused something like fifteen per cent. of the adult male population of Greece to be in the United States to-day. Life in Greece has always been hard and the country has always been overpopulated as regards the food supply. What reduces population is not pressure at home, that is constant, but a suitable outlet. In antiquity, such an outlet was caused by the better opportunities to be found in the "Greece beyond the seas." To-day it is the opportunities for money making in connection with shoe shining parlors or candy shops which are making the maidens of Sparta sing "Anathema be America because it takes away our young men," and the cause of the emigration from Greece is as much to be found in climate as was that in antiquity, that is, not at all.

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[*] Esarhaddon, cf. n., * p. 434; Ashur bani apal, Rassam Prism, VIII. 87ff.

[†] Deut. 32, 10.

[‡] Breasted, "Records of Egypt," I. 316.

[§] Ib. 319.

[||] Ib.

[¶] Ib. 322.

[**] Palestine, 250.

[††] Ib. 396.

[‡‡] Ib. 374.

[§§] Thucydides and his Age, passim.

As to the "favorable conditions centering near the time of Christ,"* we have as much right to deny this because Josephus† tells of a serious famine in the time of Herod which could be stopped only by the importation of Egyptian grain as we have, with Professor Huntington, to say that one of his periods of bad climate is proved by a mention of a famine in the times of Ramses III.‡ His quotation from Strabo§ showing that camel traders travel from Petra to Leucecome with ease and safety "with so large a body of men and camels as to differ in no respect from an army,"‖ really proves that so large a force was necessary to guard against desert robbers and that the difficulty of crossing the desert forced the use of camels in place of the much more economical pack mules. The hunger, weariness, and sickness encountered by the army of Augustus¶ sufficiently indicates the condition of the country. We might equally well argue that up to our own days Arabia has been fertile because there have been three great bodies of pilgrims who have gone every year to Mecca, with "so large a body of men and camels as to differ in no respect from an army," one along the western edge of the desert where Professor Huntington admits that to-day we have desert country, one straight across the Sinaitic peninsula, in spite of the "hardships of travel," and a third from Persia straight across the heart of the peninsula. There are no indications in the ancient writers to prove that caravans so large or so frequent crossed the peninsula in antiquity.

That Arabia was to some extent opened up to trade in Roman times is of course well known. But then so is the Arabia of the present day. When Professor Huntington says, "The trade of Arabia was highly important, although now it is practically nothing,"** no one would suspect that this "practically nothing" meant some $55,000,000 annually.†† We can hardly make the trade of antiquity more. And it is very significant that the exports of antiquity are practically confined to desert products, a fact that hardly tends to make us believe in a great agricultural development. The trade route found by Carruthers was indicated by a well and a guard house. This may very well be the road of twenty days' length which ran from Egypt to Persia. We might think that this tended to support the theory, did we not read also that it ran through the desert and was used only by the postal service,[*] an exact parallel to the post route of our own day from Damascus across the desert to Baghdad. To prove that conditions have changed in the meantime, we should have been told of villages with indications of agricultural operations where now there are none. But to-day in North Arabia we have such fertile oases as Hail, Tema, Jauf, Khebar, Aneza, Boreda, not one of which can be proved more fertile in antiquity than they now are. Nor should we forget that the only real civilization of antiquity in Arabia was in Yemen, and in the Yemen of to-day travelers "speak with enthusiasm of the wealth of the soil."[†] We know of course of Ghassanide settlements east of Syria, but these were due only to the protection of Rome.[‡] Professor Huntington exclaims, when in the Arabah, "that such a desert was once the scene of active traffic, seems incredible. Yet the next day . . . we were following the track of thousands of ancient caravans."[§] Yet he himself has just told us of the pilgrims of the Mecca railway which runs through territory far worse than the Arabah.

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* Palestine, 402. † Ant. xv. 305. ‡ Palestine, 303. § Strabo xvi. 4.23. ‖ Palestine, 274. ¶ Strabo xvi. 4.24. ** Palestine, 273. †† R. A. Wahab, Ency. Britannica, s. v. Arabia.

The fact that Ptolemy mentions five "rivers" in Arabia,[‖] or one at Palmyra,[¶] no more proves that they were rivers in our sense of the word than does the appearance on our maps of river-like stream beds to-day. In the one case as in the other, we have simply dry stream beds for which the Semites have always had a special term to distinguish them from the true river with constantly running water.

Professor Huntington has written a chapter in explanation of the sudden rise of Palmyra, which he thinks due to abandonment of the more southern routes on account of the growing aridity. But he has first to prove that these routes are as important as he claims,—the Lucian passage certainly does not give this impression,—and then that their abandonment was really due to aridity. The somewhat cavalier dismissal of the "opening of communication by sea" as a cause indicates one of Professor Huntington's greatest weaknesses, a failure to realize the important part played in the history of trade routes by a substitution of one by sea for the old one by land. For instance, he tells us that "increasing aridity, far more than any other cause, has reduced the traffic passing through Samaria to such small proportions that the old trade routes are almost negligible as a factor in the economic and social condition of Palestine."[**] He forgets that no goods ever go now from Egypt to Babylonia by land, for the steamers to the Persian Gulf have taken the place of the camels, while the coastwise trade, fed by the railroads which enter the country from Jaffa, from Haifa, and from Berut, and continued in the interior lines northward to Aleppo, and southward to Medina, has made trade by caravan a matter of past history. But the route still remains, for the railroad from Haifa to Damascus and then to Aleppo is nowhere far from the line of the old highway which Professor Huntington now thinks can be safely neglected by the student of economic and social conditions.

An even more striking example of his inability to estimate the importance of sea competition is to be found in his treatment of the route from Gaza into Egypt. "Egypt could hardly have been so keenly interested in Syria, if the two lands had been separated by the deserts of to-day"[††] forgets the fact that to-day, under British control, the Egyptian outposts are at Raphia, barely a day's march south of Gaza, that there is an Egyptian governor at Arish, also north of the four days' desert, that but a few years ago there was almost war between Turkey and Egypt over this very country, the trouble resulting in a delimitation commission which gave a good third of the Negeb, including Kadesh Barnea, to Egypt. A survey of the history of this boundary* indeed shows that "age after age Egypt has been in the position of a fortified camp, open to attack on its north-eastern frontier and therefore always having its advanced lines as far as possible on Syrian soil," and this it is which has caused Egypt always to be "so keenly interested in Syria." As to the route itself, the traveler who has marched along it in the month of January with flowers along his path finds it not easy to realize that this is the same route of whose difficulty the ancients have said so much. There is still a fair amount of local traffic, though even this, so far as grain is concerned, is now cut off by the tramp steamers which anchor off the coast at Gaza. As to the through route, who will now be so foolish as to take the expensive ten days' march through the desert when he can, for a few piasters, go to sleep at Jaffa and awaken at Port Said? Professor Huntington compares the "great armies of the ancients" with the "little army of Napoleon." It is to be feared that he has never found out how small these armies really were. It can be stated without fear of contradiction that no ancient army of such a size penetrated so far into the interior of Arabia as did those from Egypt commanded by Tusun Pasha in 1811 and by Ibrahim Pasha in 1816.

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[*] Lucian, Rhet. Præcept. 5. [†] Margoliouth, Hastings' Dictionary of the Bible, s. v: Arabia.

[‡] The "Ghazanide palace of Meshita . . . built by Persian invaders in the sixth century," (Palestine, 209,) is a curious combination of the now abandoned theory of Fergusson and of the theory at present dominant.

[§] Palestine, 219. [‖] Ib. 273. [¶] Ib. 362. [**] Ib. 407. [††] Ib. 269.

"From all the country up to Antioch . . . and to Tarsus . . . the Eastern trade went through Palmyra."† This would demand, for economy of effort, a route running southeast. But the one road, as the remains discovered by Professor Sterrett still show, ran northeast. Further, the road from Antioch to the east, as proved by an exceptionally large number of campaigns, always went by the Euphrates route, while that from Tarsus regularly went through the Amanus Gates, Germanicea, Samosata, Amida, Nisibis, Nineveh, though cases of the route to Birejik and then due east are known. But the point to emphasize is the fact that we never, out of all the numerous accounts of routes eastward from these two cities, have one single case of one running through Palmyra, and indeed a glance at the map should be sufficient to prove its unlikely character.

The immediate cause of the rise of Palmyra to power is clear. It was due to that strange breakdown of the Roman central administration which took place in the third century. Odenathus and Zenobia, like the majority of the so-called Thirty Tyrants among whom they are included by the almost contemporary writers of the Augustan History, were frontier rulers who had taken the opportunity of the breakdown to revolt from the central authority. Their situation in the desert was of special advantage to them because it gave them protection from attack, while their distinctly Oriental character gave impetus to what was essentially a reaction of the east against the west. When the Roman state began to recover from its malady, Palmyra at once disappeared as a power, the result of the attack by Aurelian, and not of an unfavorable change of climate. What combination of social, political, and economic conditions caused this breakdown and the slow and partial recovery which followed, this is not the place to discuss, but we should notice that it is to this same breakdown of government and not to climatic causes that we are to ascribe that dearth of architectural inscriptions from 211 to 324 which has been so much emphasized in the book.‡

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* See more fully in Olmstead, Sargon, 61ff.

† Palestine, 343.

‡ Ib. 334.

Professor Huntington was in Palestine in a particularly dry year, and this circumstance has given him a distorted idea as to the amount of water to be found. For example, he says in regard to Petra, "it is almost past believing that such a city could exist in so dry a situation."[*] The year we spent in Palestine was not, as we found to our sorrow in Galilee, an abnormally wet one. But at Petra we found the stream of water reaching down as far as the Khazneh, while a little above we celebrated the Fourth of July by taking a bath. At the point where the water went underground into the sands of the valley, there was certainly enough water to have filled a pipe of the size of the one which was found almost at this very spot. Accordingly, we may assume that in ordinary summers the people of Petra had as much water as they thought it worth while to make a pipe for.

Other minor points may be noted. Against change in the country about the Lake of Galilee[†] we still have important springs, while the rock cut aqueduct at Ain Tabigah shows that canals were needed in earlier times. No argument can be made from the accounts of Josephus, for it has long been recognized that he exaggerates as much here as he does in the case of the population of Jerusalem. The elaborate picture of Engedi drawn by Professor Huntington[‡] finds little justification in the "wilderness of Engedi," where David was able to flee from Saul,[§] or with the listing of it as one of the villages of the wilderness.[‖] That in the late Canticles we should have a reference to "vineyards of Engedi"[¶] is not surprising, but the admission of Josephus that it is a small place (polichne)[**] means much in a writer who always grossly exaggerates.

The Negeb question has already been discussed in detail elsewhere,[††] and it has been there shown that the lack of artificial mounds, of pre-Hellenic pottery, the references in the Old Testament and in the other pre-Christian literature, all prove that there was no more than a semi-nomadic population here. To that we may add that the evidence of the crops is by no means in favor of a great difference between antiquity and now. The only crops of which, so far as I know, we can be sure in antiquity are the cereals and grapes. Comparatively few acres are covered by the heaps of flint on which these grapes were trained, and indeed but a small part of the country, on the evidence of the remains, was cultivated in antiquity. This was only where there was actual water from the wells and water holes, or on the lower slopes of the apparently dry stream beds where the water seeping through the soil appears in the frequent themail or water pits. Professor Huntington tells of grape vines nursed through the drought. My note-book often speaks of grain fields which compared favorably with those seen to the north; now and then we found tobacco patches; durra grew on the edge of the sand dunes as if American corn, and we once found figs. When we remember that the land is still held only by semi-nomadic Bedawin, we are not surprised to find that the methods are of the crudest and the results comparatively poor. Nor can we, even for antiquity, demand that the inhabitants secure all their food from the nearby fields. Even if they had crops of grain, there is no need of assuming that vegetables and fruits need have been grown here. My own university town is about the size of Sebeta in the Negeb and is the center of a rich agricultural region, but we secure our vegetables by way of St. Louis. How much more this must have been true as the main reason for the development of these towns was to be found in their position of advantage in trading with the more desert regions further south.

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[*] Ib. 222.

[†] Ib. 179.

[‡] Ib. 101ff.

[§] 1 Sam. 24.

[‖] Joshua 15, 62.

[¶] 1, 14.

[**] Bell. Jud. iv. 402.

[††] Olmstead, Sargon, 56ff.

Because the poverty ridden peasant or semi-nomad, with no reserve to fall back upon in bad years, cannot now make a living in a semi-arid country is no reason why it could not be done in Roman times when capital was abundant and capitalists controlled the peasant, already half a serf. Only our own days have seen the accumulation of capital comparable to that of the period when the Negeb cities were built, and even now we see many failures—for example, Garden City in Kansas, where just this lack of a reserve has caused the farmer to give up the attempt to carry on his farming in the face of a series of bad years. When Professor Huntington demands that Beersheba and Aujeh "raise good crops every year,"* he demands more than any American farmer, in much more fertile country and with all his argicultural knowledge, has a right to expect.

We have thus tested in detail a considerable proportion of the facts which Professor Huntington has cited to prove the theory of pulsatory climatic changes. Some have proved to be no facts at all, others seem to prove the exact reverse of his theory of the development. In these explanations, he has minimized or entirely omitted recognized causes along geographic, social, economic, and political lines. He seems to have claimed for his theory all facts which at first sight seemed to be in favor of it, without analyzing the antecedents or testing it for modification or rejection. Probability may well be in favor of a gradual movement towards aridity over the entire globe, and there may have been such fluctuations as the theory demands. But it is evident that Professor Huntington has not used his material with adequate care, his periods cannot be shown to agree with such facts as we have, and the historian, for the present at least, cannot use his results in writing his detailed history.

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CLIMATIC CHANGES IN THE NEARER EAST: A REPLY

To the American Geographical Society:

An article such as that of Professor Olmstead in the *Bulletin* is of great value in emphasizing the fact that there are two sides to every question. I recognize that in the earnestness of the pursuit of a new and engrossing theory I am in constant danger of doing what Professor Olmstead accuses me of, namely, claiming for the theory "all facts which at first sight seem to be in favor of it without analyzing the antecedents or testing it for modification or rejection." Therefore I welcome all such criticisms, and am ready to modify my theories so as to bring them into accord with the facts. It must be borne in mind, however, that I have nowhere claimed finality for the climatic curves which I have published, nor for the theories which they represent. The whole conclusion to which the facts set forth in "The Pulse of Asia" and "Palestine and its Transformation" have led me is summed up in the preface to the latter book in the statement that "the climate of the past five thousand years has been subject to numerous changes, (and) these *may have been* a potent factor in the guidance of *some* of the greatest events in history." I emphasize the words "may have been" and "some" because I do not want to be understood as claiming that climatic changes are anything more than one of several important but, as yet, little understood factors, which may perhaps have co-operated with the well-known political, social, and religious factors upon which historians have rightly laid so much emphasis. My attitude toward the whole matter is expressed on page 403 of "Palestine and its Transformation," where I present a curve entitled "Approximate Climatic Fluctuations of the Historic Period." The statement is there made that, "The line representing climate—as here given—makes no claim to finality. The researches of a single year may cause the shifting of a curve a century or more, or may smooth out some minor curve and add another. Yet in its main features I believe that it will stand."

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* Palestine, 282.

The investigations of the two years since these words were written have strongly confirmed me in the opinion expressed above, and Professor Olmstead's article, while most welcome as pointing out certain minor errors, does not in the least alter that conviction. When the smoke of his article clears away, it will appear, I think, that he has merely attacked a minor outpost and not the main fortress, and that, even so, his attack has not been successful. Let us proceed to count the dead and measure the breaches in the walls.

The first point upon which Professor Olmstead lays stress is that I have assumed the existence of trade routes across the Syrian desert in places where there is no evidence of any such thing. He attempts to prove this by informing us that Lugalzaggisi says nothing about the exact routes which he followed, that the sites mentioned by Sargon and Gudea have hitherto been wrongly identified, and that the Amarna letters make no mention of any route going south of that by the Euphrates. But what does this signify? It merely indicates that if scholars disagree about the extent of Lugalzaggisi's conquests and the places mentioned by Sargon and Gudea we must leave those particular pieces of evidence in abeyance. In writing about these matters I followed good authorities, those that are reputed highest, but if later research places their results in doubt, that by no means disproves the theory of climatic changes, nor does it indicate that there were no roads across the desert. It merely leaves the matter unsettled. Curiously enough Professor Olmstead does not see fit to finish this subject in the paragraph under consideration, but defers it until he takes up the discussion of the conditions at about the time of Christ. There, with apparent forgetfulness of what he has said before, he speaks as if it were a well recognized fact that in those days there existed trade routes which now are not passable for caravans. The well and guard-house east of Petra, which I have described on the authority of Carruthers (Palestine, pp. 275-277), seem to be accepted by Professor Olmstead as conclusive proof of an ancient road leading from southern Palestine and Egypt to the Persian Gulf. His comment on it is that "this may very well be the road of twenty days' length which ran from Egypt to Persia." To-day there is no possibility of such a road by reason of lack of water, as the Arabs themselves plainly state and as the explorer Carruthers has well shown. Professor Olmstead further informs us that according to Lucian, who lived from about 120 to 180 A. D., and whose writings belong to the period from 150 to 180 A. D., this road "ran through the desert and was used only by the postal service, an exact parallel to the post-route of our own day from Damascus across the desert to Baghdad." If Professor Olmstead had looked at the diagram of

"Approximate Climatic Fluctuations during the Christian Era" on page 327 of "Palestine and its Transformation," he would have seen that by the time of Lucian there already seems to have been some decrease of rainfall as compared with the time of Christ. In a word, Professor Olmstead's contribution to our knowledge of routes in the Syrian desert comes to this: he throws doubt on some of the identifications of sites and routes which I had supposed to be correct, but which are at best of only slight value because they date back so far that at present any exact knowledge concerning them is impossible. Second, as to the days of Rome's greatness, when, according to the hypothesis under discussion, conditions were drier than in the days of Sargon, but nevertheless much moister than now, he accepts the evidence of the ruined guard-house as proving that a road existed where none can now exist for lack of water; and furthermore he speaks of this as if it were a well-known road. Finally at a period 150 years after Christ, when, according to the hypothesis, aridity had increased somewhat, he says that this road was merely a post road, and adds the unproved statement that it was "an exact parallel to the post route of our own day from Damascus to Baghdad." The Damascus-Baghdad road was used only a few years when the British were trying to establish quick communication with India, but it proved too difficult and was abandoned. It is quite possible that after the days of Lucian the road from Egypt eastward fell into the same state as that of the Damascus road in the nineteenth century; now it is far worse. Professor Olmstead advances nothing which is in any way inconsistent with the theory of pulsatory climatic changes and much which fits that theory and does not fit the theory of climatic uniformity which he is endeavoring to support.

Another of the points to which Professor Olmstead frequently refers is that ancient accounts from the very earliest times indicate that Arabia was always a desert. Of course it was. No one doubts this for a moment, and nowhere have I consciously given any hint to the contrary. Yet Professor Olmstead, when speaking of the supposed roads across the desert, remarks that "to prove that conditions have changed . . . we should have been told of villages with indications of agricultural operations where now there are none. But to-day in north Arabia we have such fertile oases as Hail, Tema, Jauf, Khebar, Aneza, Boreda, not one of which can be proved more fertile in antiquity than they now are." This quotation is illuminating in two ways. It shows, first, that the critic is quite as liable to make rash statements as is the criticised. The fertile oases whose names sound so well are miserable little towns scattered over an area about 500 miles square, the only places worth mentioning in 150,000 square miles of desert. I think that I am safe in saying that no one of them has ever been visited by any man who has had the necessary geographical training and also the time and freedom adequately to investigate the matter. I know that I am safe in saying that no account of any such investigation has ever been published. Professor Olmstead's statement that no one of these can be proved to have been more fertile in the past than at present is absolutely without foundation.

The quotation as to oases and as to villages in the desert is illuminating in another way. It shows that in writing upon this subject I have not taken due account of the fact that in the nature of things the historian or the general reader cannot be expected to have much idea of the true nature and causes of climatic phenomena. Professor Olmstead seems to have gained the idea that my theory of climatic changes demands that the desert shall at some time have blossomed as the rose. I have emphasized the fact that the change of climate demanded by the hypothesis is not radical. Here is what I have said on page 261 of "Palestine": "It would be a great advantage to Palestine if the winters were a few degrees colder, so that snow fell more abundantly and stayed longer than now, and if the rainy season were a little longer, so that there would be less danger of drought in the critical seasons of fall planting and spring growth. In the following pages it must be borne in mind that no greater changes of climate than this are postulated . . . If the climate of Palestine during historic times were ever different from what it is to-day, it probably resembled that which would now prevail along the Ægean coast of Asia Minor if the relief of the land and its relation to the sea were like those of Syria." As I was dealing mainly with Palestine I assumed that a statement of the effect of such a change upon the desert was not necessary. Any one possessed of a moderate knowledge of climatology would know that a change of the kind here indicated, while it might have profound effects upon man, would not make the desert habitable. It would merely increase the size of the areas of cultivation along the edges of the desert, it would increase the amount of grass and forage in the desert, it would make the springs more numerous and the wells less likely to dry up, and it would enlarge the available water supply of the oases and thus enable them to support a larger population. In "Palestine and its Transformation" I have given many instances where it seems to me that just these effects have followed. Professor Olmstead has ignored these, which are the strongest buttresses of the theory of pulsatory climatic changes, and has devoted himself to proving that Sinai and Arabia were always deserts, a contention which is perfectly in accord with the theory that he attacks. They were deserts, and the man from the oasis or from Egypt must always have suffered when he tried to cross them, but they were apparently deserts in which the watering places and the forage were somewhat more abundant than now.

I might go on to show other cases in which Professor Olmstead has failed to grasp the full import of what I have written. This may be due to lack of clearness and precision on my part, and if so I must beg for pardon. For instance, in discussing the Exodus Professor Olmstead takes no account of the fact that my climatic curve shows a period of comparative aridity at that time, an aridity which may have had much to do with the movements of the early Hebrews. I have everywhere assumed that while a few Israelites may have come from Egypt, the majority came probably from the desert. Again, Professor Olmstead refers more than once to the vines which I mention at Aujeh in the Negeb. Here is what I have said about the matter: "The [ruined] walls and terraces just described were . . . manifestly intended . . . for olive groves, vineyards, orchards, or vegetable gardens. To-day, except for the few tiny gardens watered by the gasoline pump at Beersheba, no trace of such plants is to be found in the Negeb, unless it be one or two grape vines which the officials of Aujeh have nursed through the droughts." I ought to have added that these vines were only a year old and that most had already died. Even in a desert a man with a bucket and a well can nurse a few vines through a drought.

It would be tedious to go into these matters further, but before turning to something more interesting and conclusive I feel that it is right to call attention to the rash way in which Professor Olmstead has used figures and to his extreme inaccuracy. On page 436 he says: "When Professor Huntington says, 'The trade of Arabia was highly important, although now it is practically nothing,' no one would suspect that this 'practically nothing' meant some $55,000,000 annually." He quotes the Encyclopedia Britannica as his authority. Let us analyze the figures there given. They are as follows:

Aden, £6,000,000, imports and exports combined.
Jidda, £1,405,000 imports, £25,000 exports.
Hoheda, £467,000 imports, £451,000 exports.
Oman, £550,000, of which two-thirds are imports and one-third exports.
Bahrein, £1,900,000 half imports, half exports.

Total, £10,773,000.

Out of a total of nearly £11,000,000 sterling, £6,000,000 belong to Aden. Aden is in truth a part of Arabia, but its business has practically nothing to do with that country. In the first place, it is a British colony, and its sole importance is as a port of call. Its population of over 40,000 has to import everything which it eats or wears. So far as the necessary materials come from Arabia they are included in the figures for other ports as well as for Aden. Moreover, its exports are practically confined to the re-exportation of articles which have been imported. In other words, Aden is merely a place of exchange. Practically its entire trade must be deducted before we can arrive at a true estimate of the real value of the trade of Arabia. Jidda, the next place on our list, is the port of Mecca. The disparity between its exports and imports is enormous. This means that the large amount of importation is due to the necessity of supplying food for the throngs of pilgrims. It is paid for by money which the pilgrims bring from other lands. Therefore except for the £25,000 of actual exports and another £25,000 of imports to balance this, we may fairly say that Jidda has no trade originating in Arabia. Passing on to other towns of our list, we find that all the trade of Hodeda, the port of Yemen, belongs to Arabia unquestionably. Oman, however, is only technically a part of Arabia. In all discussions such as that in which we are now engaged it is so far remote—1,500 miles from the Dead Sea—and looks out so completely toward the eastern ocean and not toward the lands around Palestine that it does not enter into the problem of the relation of the trade of Arabia to the surrounding countries. Bahrein, likewise, is remote and scarcely enters into the problem. It is an island in the Persian Gulf, its exports are largely pearls, and its imports are paid for by the pearls gathered from the sea. Thus it is seen that while Professor Olmstead is technically right in saying that the trade of Arabia amounts to $55,000,000, he is wrong in a much truer sense. His statement is one of those misleading truths which lead to wrong conclusions. So far as the problem now in hand is concerned, the trade of Arabia amounts to less than £1,000,000, and practically all of that is in Yemen, 1,400 miles from Palestine. This small sum of $5,000,000 represents the trade of an area about half as large as the United States. The city of Portland, Maine, whose population amounted to 59,000 in 1910, had a trade of $16,000,000 in 1907 and of $12,200,000 in 1908. It seems justifiable to say that, so far as the problem now before us is concerned, the trade of Arabia is "practically nothing."

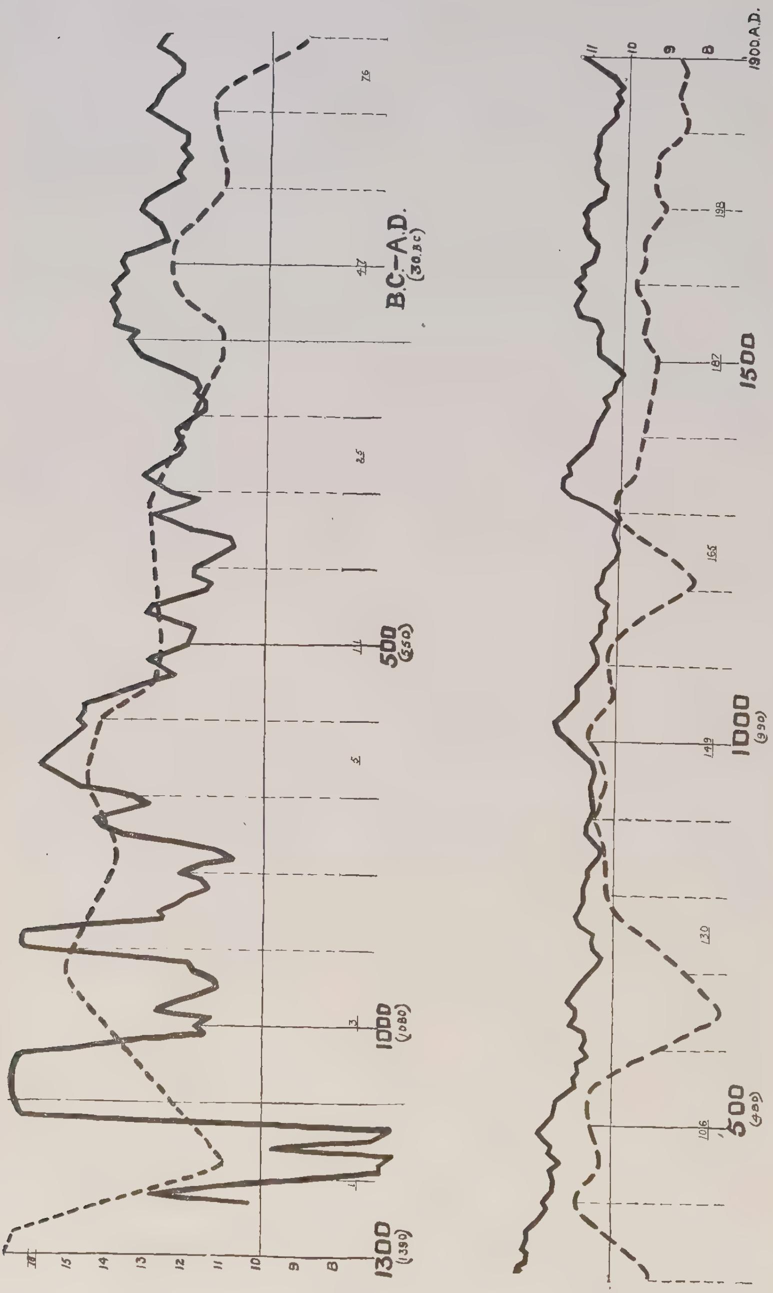
Professor Olmstead is not only careless in his use of figures, but he is far from careful in his representation of the views of others. A comparison of two quotations will illustrate the matter. Professor Olmstead makes the following statement: "[Professor Huntington] accepts the numbers of the Exodus, as well as the general fact of such an event, considers that the data in regard to population given by Deuteronomy is at worst only exaggerated, and even can believe in the accuracy of the census of David." Here is what I have actually said:

"It may be admitted that many or even most of the details as to the wanderings of the Israelites are inaccurate, and that there is much exaggeration. It can scarcley be denied, however, that the story has an historical basis . . . In the records handed down to us the number of invaders may have been multiplied ten-fold or twenty-fold, but it must have been large" (p. 271 "Palestine, etc."). "In David's time the population, according to the census which he took, is reported to have been between five and six million. Most authorities agree with Hilderscheid, one of the strongest opponents of the theory of climatic change, who says that although these figures may be regarded as 'in Oriental fashion greatly exaggerated, yet it cannot be doubted that the population of that time was much more numerous and dense than it has now become'" (p. 263). If all Professor Olmstead's statements are on the same plane as those in regard to the present trade of Arabia and my belief in the accuracy of the census of David, his whole contention falls to the ground.

I might go on to discuss other points raised by Professor Olmstead, but the dissection and criticism of another man's arguments are apt to prove wearisome to the reader. Let us turn to something constructive. In the present discussion two points are at issue—first, the verity of my hypothesis as to the actual existence of climatic changes on a large scale and extending over large periods; and second, the possible effect of such changes upon historic events.

This second problem belongs primarily to the historian; the task of the geographer is to establish his own conclusions as a sound basis upon which his historical colleague can work. Therefore I shall turn to the purely physical side of the matter. In order to test the conclusions formed in Asia, I went to California in the summer of 1910 and 1911, under the auspices of the Carnegie Institution of Washington, and among other things made use of a method which was originally suggested by Professor A. E. Douglass of the University of Arizona. In dry regions like Arizona the growth of trees depends almost entirely upon the amount of winter precipitation. If the snow falls heavily during the winter and the rains last well into the spring, the long summer season of drought has compartively little effect, and the trees add to their trunks a thick layer of new wood. In dry seasons the reverse naturally takes place. It is evident then that by measuring the thickness of the rings of annual growth upon the stumps or trunks of trees that have been cut we can determine the relative amount of rainfall at any period during their growth. Accidents will, of course, affect the growth of individual trees, but actual experiments show that when a sufficient number of trees is used the effects of individual idiosyncrasies and even of such things as forest fires disappear, and the curve of growth corresponds closely to that of rainfall. To be sure, certain corrections must be made in order to eliminate the difference in the rate of growth of young trees and old, but the corrections are purely mathematical and can easily be made provided sufficient trees are available.

In California I measured the rings of about 200 of the so-called Big Trees, or *Sequoia gigantea,* high on the slopes of the Sierra Nevadas. The resultant curve is given herewith, the solid line. Horizontal distance represents the course of time, while vertical height represents the rate of growth. Where the curve is high the trees grew fast; where it is low they grew slowly. The numbers in parentheses below the dates at the bottom of the diagram represent the maximum probable error in ascertaining the years. The error may be much less than is indicated; it can scarcely be more. The small numbers within the body



Diagrams showing rate of growth of the "Big Trees" of California at different Periods.

of the diagram represent the number of trees used in preparing the curve. Back of about 500 B. C. the number is so small that the degree of accuracy is not high. From 200 B. C. onward there can be practically no question as to the general accuracy of the results, although further investigation may necessitate minor modifications. There is, however, some question as to whether the low places should not fall somewhat lower than they do, but this is immaterial for our present purpose. It arises from the fact that the final mathematical corrections cannot be fully applied until more trees have been measured. Whatever changes may be made by further investigation and measurement, however, it is practically certain that the general sinuous form of the curve will remain, for a similar sinuosity is characteristic of the curves of growth of numerous other species. Moreover, within the species the sinuous form appears in the same fashion no matter whether one takes one group of trees or another. It seems to indicate, and I may almost say proves, that the climate of California during the past 2,000 years has not only grown drier, but has also been subject to pronounced pulsatory changes.

Beside the curve of the trees from California I have placed another, that of the approximate climatic fluctuations of western and central Asia as given on pages 327 and 403 of "Palestine and its Transformation." This is the visual expression of the theory which Professor Olmstead criticises. The curve is far from final; many portions of it, as I have shown again and again, are based on fragmentary evidence, and will be modified as soon as more data are available. Everything now seems to indicate that each change in the Asiatic curve will bring it more into harmony with that of California. Even as the curves now stand there is a marked degree of similarity, which in some cases, such as the periods centering at the time of Christ and 1000 A. D., extends to details. The lesson of the curves is obvious. We have before us two attempts at a reconstruction of the climatic conditions of the past. One, that of Asia, is based on fragmentary evidence of many kinds and is full of the errors which are inseparable from work of a new kind. It is also full of the errors which arise because of the prepossessions and personal equation of the investigator. The other is a continuous record based on purely mathematical considerations. It cannot be changed by the investigator's private opinion and predilections. Yet the two curves in the main agree. They both indicate that the climate of the earth is subject to changes, and that those changes are of a pulsatory nature. Moreover, the changes as indicated in the California curve are of sufficient intensity to cause serious modifications in the economic conditions of the inhabitants of the country. Therefore they must have had distinct and recognizable historic results. Farther than this I do not now care to go. I may have misinterpreted the results in many cases, but little by little we are approaching the point of certainty as to the nature and date of climatic pulsations. With each step we are drawing nearer to the point where we, the geographers, can say to the historians, "Here are the definite facts as to changes of climate. What results have they produced?" ELLSWORTH HUNTINGTON,

Yale University.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOICETY

Captain Amundsen's Cablegram. Capt. Amundsen cabled the following to President Huntington on March 19 in response to the President's message of congratulation in behalf of the Society under date of March 11 printed in the March *Bulletin:*

Mr. Huntington, President American Geographical Society:

Sir: With the heartiest thanks for your kind telegram.

Yours very truly,

Roald Amundsen.

An Exhibition to be given at the Society's House. At the meeting of the Council on Thursday, May 16, the working staff was authorized to collect photographs and other material to be exhibited in the large rooms on the first floor of the building. The plan is to show representative scenes in those parts of the country which will be visited by the Transcontinental Excursion, such as panoramic views of cities, the prairie of Glacial Lake Agassiz, the Bad Lands of the Little Missouri, the Minnesota Iron Mining District; views of one or two of the larger reclamation works with bits of arid plains before improvement and after; views in the Yellowstone, Glacier, Crater Lake, Mt. Ranier, Yosemite, Sequoia and Mesa Verde National Parks, the Grand Cañon of the Colorado, etc.

It is intended that the exhibition shall be ready by the time the foreign delegates on the Excursion begin to arrive in this city. After the departure of the Excursion for the west the exhibition will be open to members of the Society and the general public.

The Attendance at our Lectures. During the past session 3,766 persons attended the six popular lectures given by the Society in the auditorium of the Engineering Society's Building.

NORTH AMERICA

Magnetic Declination in the United States. Special Publication No. 9 of the Coast and Geodetic Survey contains a magnetic declination chart for the United States for the epoch Jan. 1, 1910. After the publication of the isogonic chart of the United States for 1905 so much additional data were accumulated and the secular change of the magnetic declination underwent such material modification that a new chart was demanded. Jan. 1, 1910 was selected as the epoch for the chart in order that the reduction of the observations to that epoch might be based on actual observations of the secular change.

West declination is increasing much more rapidly in the North Atlantic States than was supposed in 1905. The annual change is now about 6′ throughout New England. On the Pacific coast east declination is increasing more rapidly than in 1905, but the region of the maximum annual change is now apparently some distance inland.

The north end of the compass needle is moving to the westward at all places east of the line of no annual change and to the eastward at all places west of that line. Accordingly, three regions may be distinguished:

(*a*) In the region of the United States east of the line of no magnetic declination (agonic line) west declination is increasing at an annual rate of from 2′ to 6′.

(*b*) In the region between the agonic line and the line of no annual change east declination is decreasing at an annual rate of from 0′ to 2′.

(*c*) In the region west of the line of no annual change east declination is increasing at the annual rate of from 0′ to 5′.

Under present remarkable conditions it is impossible to predict with accuracy what the secular motion will be for even a few years in advance. There appear to be two waves of secular motion progressing across the continent in opposite directions, but it is impossible to state which one will predominate. Interesting developments may be expected in the next few years.

West declination is increasing about 7′ a year in Bermuda and about 9′ a year at the Porto Rico Magnetic Observatory on Vieques Island.

ALUMINUM IN THE UNITED STATES. Aluminum, a few years ago a rare metal, too expensive to have any particular economic value, has to-day come into wide use in a great number of industries. The consumption in the United States in 1911, according to the United States Geological Survey, was 46,125,000 pounds, the price in New York ranging from 18½ to 22 cents a pound. The Survey has just published a report by W. C. Phalen on "Bauxite and Aluminum," an advance chapter from "Mineral Resources of the United States" for 1911, which gives a comprehensive review of the industry for the year. Bauxite ore, the present source for metallic aluminum, is mined in Arkansas, Georgia, Alabama, and Tennessee, the output from these States combined amounting in 1911 to 155,618 long tons, valued at $750,649, an increase of about 5 per cent. in both quantity and value compared with the figures for 1910. The increase, though small, shows a healthful condition of the industries dependent on this ore for raw material. (*U. S. Geol. Surv. Press Bull. May 7, 1912.*)

EXPEDITION TO THE EVERGLADES OF FLORIDA. Under the auspices of the Geographical Society of Philadelphia, a botanical and geographical expedition is to be made this summer to southern Florida by Professor John W. Harshberger of the University of Pennsylvania. Professor Harshberger has made two previous trips to Florida and this expedition is to complete his studies in the Everglades region of the southern part of the peninsula. The itinerary will be approximately as follows: Making Ft. Myers near the west coast, headquarters, Prof. Harshberger will first investigate the region in that vicinity; visits will be made to several of the islands along the Gulf Coast; the Caloosahatchee will be ascended by power boat to Lake Okeechobee and the flora of that inland lake will be studied. Then the attempt will be made (if the drainage canal has been sufficiently constructed) to cross the Everglades to Ft. Lauderdale on the east coast. As no botanical geographer has ever crossed the Everglades, unusual opportunities will be presented to study a region of great scientific interest. Photographs will be taken of the vegetation, the region will be mapped botanically, and a collection of the more interesting plants will be made. An abstract of the results of this expedition will be published in the October number of the *Bulletin* of the Geographical Society of Philadelphia.

LOWER CRETACEOUS DEPOSITS OF MARYLAND. The Maryland Geographical Survey has just issued Vol. 4 of the series of Reports dealing with the systematic geology and paleontology of Maryland (622 pp. Maps, ills.). The preceding volumes dealt with the Tertiary and Quarternary deposits and the remains of animal and plant life which they contain. The present volume treats of the Lower Cretaceous deposits and their contained life.

IRON ORES OF MARYLAND. The Maryland Geological Survey has published a "Report on the Iron Ores of Maryland," with an account of the Iron Industry by Joseph T. Singewald, Jr. (Vol. 9, 1911, Part 3, pp. 123-327. Maps, ills.). The history of the Maryland Iron Industry is traced from the early colonial days when Maryland ranked foremost as an iron producer, through the prosperous period preceding the Civil War to the subsequent rapid decline in prominence due to extraordinary development elsewhere. The localities where iron has been worked or is now known to exist are described and in many instances the ores are analyzed. Nearly 300 such deposits are located on the maps in the Report. The hope is expressed that this Report will attract to the State those seeking other deposits when the richer ones used at present become exhausted.

DEVELOPMENT IN WESTERN CANADA. The Railroad lines of the Grand Trunk Pacific in Western Canada are being extended this spring, it is said, at the rate of ten miles a day and the company soon expects to be adding 120 miles to its trackage every week, the pioneer parties working day and night. A through passenger service between Regina, the capital of Saskatchewan, and Winnipeg will be established in June. Six thousand men are now at work on the construction of the Transcontinental line, in the region of the Rocky Mountains. This company is now opening virgin territory in British Columbia, where hunting opportunities are said to be unexcelled. A fine moose country extends from the region of the northern bend of the Fraser River to the Little Smoke River. Caribou are also plentiful in this district on the higher plateaus and grizzly and black bear are numerous. With the exception of antelope and mush ox, British Columbia has every variety of big game on the continent.

RAPID GROWTH OF A CANADIAN TOWN. The Mayor of Edson, a young town in Alberta, on the Grand Trunk Pacific Railway, has issued this very concise record of the progress of Edson : "Steel arrived, Aug., 1910. Population 15. Incorporated as a village Jan., 1911; population 490. Incorporated as a town Dec., 1911; population 800. Present population March, 1912, 1,253. Present places of business, 67. Value of buildings 1911, $486,000." The growth of Edson is assisted by the fact that it is the distributing point between the railroad and the Grand Prairie and Peace River Districts to the north.

THE DIABASES OF LAKE NIPIGON. In explaining the traps or diabases in the Nipigon basin, north of the Keweenawan lavas of Lake Superior, as surface flows, Alfred W. G. Wilson ("Geology of the Nipigon Basin, Ontario." Memoir No. 1, Canada Dept. of Mines, Geol. Surv. Branch, 1910, pp. 72-100) returns to the view of Sir William Logan. Ingall and Lawson, however, have not held this view and the latter in 1893 put forward strong evidence in support of the hypothesis that they are laccolithic sills. Some of the traps Wilson acknowledges to be of this origin. For the others, forming hilltop caps, although they show none of the glassy, amygdaloidal, or flow structures of lava flows, Wilson feels that the presence of soils beneath the lavas and the adjustment of the diabase to a pre-diabase topography with a relief of as much as 300 feet, coupled with various relationships of unconformities and of included boulders, and the absence of laccolithic roof phenomena, warrant his regarding these traps "as the basal residuals of a once very extensive flow or series of flows of a very fluid diabase over the well dissected topography of a previous cycle."

LAWRENCE MARTIN.

SOUTH AMERICA

A New Chilean Historical and Geographical Society. A new scientific society was founded in Santiago de Chile on September 21, 1911, under the name of "Sociedad Chilena de Historia & Geografia." The administration of the society is in the hands of a council composed of sixteen members, eight of whom are elected every two years.

Among the councillors are Luis Riso Patrón, the director of the Oficina de Mensura de Tierras, who is also president of the geographical section of the society, and F. W. Ristenpart, professor of astronomy at the University of Chile and director of the astronomical observatory of Santiago. Enrique Matta Vial was elected secretary, Enrique Blanchard Chessi, librarian, and Ramón A. Laval, treasurer.

The society is divided into three sections: History, Geography and Archeology. Each section has its own president and secretary. The society will have its headquarters at the National Library for the present. Its work will be made known by means of a Bulletin which it is desired to exchange with the publications of other scientific institutions. Correspondence should be addressed to the Secretary, Correo Central, Casilla 1672, Santiago de Chile.

Ascent of Mt. Coropuna. Prof. Hiram Bingham of Yale, Director of the Yale-Peruvian Expedition in 1911, described in *Harpers Monthly Magazine* for March his ascent of Mt. Coropuna, Peru. This mountain was marked on the older maps of Raimondi as having a height of 6,949 meters; but as near as Prof. Bingham could determine his height with his aneroids, the mountain, however, has an altitude of only 21,525 feet above sea-level. The ascent was comparatively easy. The summit of the mountain is almost flat for an area of nearly an acre. It is oval in shape 100 feet north and south and 175 feet east and west. The summit slopes rather abruptly on the north side, moderately on the west and very gently for some distance to the south and west.

AFRICA

Mapping Tripolitania. In a series of letters addressed to the *Rivista Geografica Italiana* (March-April, 1912), Col. E. Caputo says that the work recently undertaken by the Istituto Geografico Militare in the new colony is mainly devoted to the compilation of a basal map of Tripolitania on a scale of 1:100,000. At the same time some of the topographers have been detailed for the preparation of a map in 1:25,000 of the Menscia region. It is intended to issue eventually special large scale maps of the more important districts.

No absolutely authoritative map of this portion of Northern Africa yet exists. The coast has been surveyed by the British Admiralty and four different maps have been published by the Istituto Geografico Militare. All the data available for this compilation consisted of a very small number of astronomical observations, some compass surveys of the routes followed by the more reliable explorers and a few conflicting barometric determinations. Such were the elements used in the "Carta dimostrativa della Tripolitania alla scala di 1:1,500,000," comprising the region north of the 22nd parallel and within meridians 9° and 25° east. Three other maps on a larger scale were prepared in the same manner.

The party sent by the Istituto Geografico Militare is headed by Col. Eugenio Caputo. Prof. Ing. Antonio Loperfido has charge of the geodetic work. Lieut. Giannini and Chief Topographer Alessandrini are to make the necessary astronomical and geodetic observations. Captains Quaglia, Cavallo, Milanesi and Bonatti have been detailed to undertake a preliminary survey. Prof. Loperfido will have to determine the astronomic position of the City of Tripoli as well as a suitable base line to be used in subsequent triangulation. He will also collect the necessary nautical and geometric tidal data for the determination of the true sea level to be used in the computation of altitudes.

The following work is now being carried on by the Italian Survey: determination of latitude and azimuths, precise leveling, determination of the mean coefficient of atmospheric refraction and topographic triangulation to serve for the relief of the Menscia district. Immediately following the completion of this work it is intended to proceed with the measurement of a geodetic base on the borders of the oases of Gurgi and Gargaresc.

The Menscia Survey is in fair progress. It was expected that the original map would be ready for reproduction some time in May. The delay in its preparation is due in part to the wealth of details which the country offers. It also happens occasionally that the topographers are requisitioned by the military commander for work of an urgent nature. Barring such delays the work is said to be proceeding very satisfactorily. LEON DOMINIAN.

THE GERMAN EAST AFRICA CENTRAL R.R. COMPLETED TO TABORA. On Feb. 25 the first locomotive on this railroad, now building between Daressalam, the capital of German East Africa, and Lake Tanganyika, arrived at Tabora, the chief point on the route between the Indian Ocean and Tanganyika. Tabora was long the central mart of the Arabs, where all trade routes converged from the southern part of Victoria Nyanza, the eastern coast of Tankanyika and the northern shores of Lake Nyasa. The railroad has thus tapped the great trade center of the interior of the Protectorate. It has taken two years to build this 525 miles of the line. The appropriation for the construction of the railroad to Tabora was greater than the sum expended, so that a considerable amount of funds remains to be applied on the further extension of the road. It is probable that trains will be in operation from Daressalam on the Indian Ocean to Lake Tanganyika, 800 miles, early in 1914. This rail route will then be the shortest route from the Belgian Congo through German East Africa to the Indian Ocean. (*Geog. Zeits., Vol. 18, 1912, No. 4, p. 225.*)

ASCENT OF MT. ELGON. The Austrian Uganda Expedition, led by Mr. R. Kmunke, ascended the extinct volcano Elgon in December last. This famous mountain, about 60 miles N. E. of Victoria Nyanza, was first brought to notice by the British explorer Joseph Thomson, who found on the lower slopes many artificial caves inhabited by natives. Kmunke pitched his camp in the crater at an elevation of 12,529 feet and later ascended Jackson Peak, the southwestern summit, and finally Franz Josef Peak on the north side of the mountain, where Elgon attains its greatest elevation, 14,192 feet.

LE SERVICE GÉOGRAPHIQUE DE MADAGASCAR SUSPENDED. (*Annales de Géographie,* Vol. 21, No. 116, 1912) says that this survey service which has contributed so largely to the mapping of Madagascar, has been virtually suppressed since the close of last year. The survey was established in April, 1896. The discontinuance of this important geographical work, unprecedented in the history of military cartography, is due to the fact that the budget of 1912 contained no provision for its support. The appropriation provided for carrying it on has averaged about $18,000 a year. With a budget scarcely one-fifth those devoted to the mapping of French Indo-China and French West Africa, the Madagascar Service was surveying and publishing over four sheets a year in 1:100,000 and had begun the publication of a map in 1:200,000. Its reconnaisance map in 1:500,000 was completed in 1905. The entire work has now been suspended, the offices closed, and staff disbanded. The result is that the only map of the whole of Madagascar (1:500,000) is inadequate for the study and establishment of wagon and rail routes. The service will necessarily be reestablished some day, but there is no telling how much its plant will have deterioriated by that time.

ASIA

Studying a Volcano in Eruption. The Swiss Geologist, Dr. Arnold Heim, who has been engaged recently in geölogical field work in Java, ascended the highest mountain of the island, Smeroe (12,057 feet) and reached its summit just as the eruption of Nov. 15, 1911, was beginning. He was accompanied by the Dutch mining engineer, Mr. Van Goghand. They were able to make important observations and to secure photographs which will later be published.

Ethnological Explorations. In February, Dr. Herbert Müller of the Anthropological Museum in Berlin started for China to begin ethnological researches in Manchuria and Eastern Mongolia.

EUROPE

Eighteenth Meeting of German Geographers. According to the program of the eighteenth "Deutscher Geographentag," held at Innsbruck on May 28, 29 and 30, the papers to be presented were grouped under the following subjects: Exploration; Geography of the Alps: (a) Anthropo-geography, (b) Geomorphology; Teaching of Geography; History of Geography.

Under Exploration the following papers were announced: "Report on the Results of the Austro-Italian Exploration of the Adriatic in 1911-1912," by Prof. Brückner; "The Physiographic Results of the German Tendaguru Expedition to East Africa in 1911," by Dr. J. v. Staff; "The Physiography of the Tian Shan in its Relation to Climate and to the Development of Plant Life," by Prof. Merzbacher; "Glacial Studies in the Western Tian Shan," by Prof. Machatschek; "Main Results of the Expedition to German East Africa in 1906-07," by Prof. Fritz Jaeger; "An Oceanographical Cruise on the Atlantic Ocean in 1911," by Dr. A. Merz.

The place of the meeting naturally led to the choice of the Alps as a subject for special consideration. Under this heading the following papers were to be presented: (Anthropo-geography) "The Uninhabited Districts of the Eastern Alps," by Prof. N. Krebs; "Historical Development of the Bavarian-Tyrolean Boundary," by Dr. O. Stolz; (Geomorphology) "Contribution to the Geomorphology of the Styrian Marginal Alps," by Prof. J. Sölch; "On the Origin of Alpine Valley Troughs as Illustrated by the Hohe Tauern," by Dr. L. Distel;; "On the Unity and the Causes of the Glacial Period in the Alps," by Prof. R. Lepsius; "Tentative Reconstruction of the Inn Glacier," by Dr. R. v. Klebelsberg; "Timber- and Snow-line in the Alps: A Contribution to the Climatology of Alpine Regions," by Prof. V. Paschinger.

To the teaching of geography papers were to be devoted by Prof. R. Sieger on "The Position of Geography in Austrian Secondary Schools [Mittelschulen]," and by Prof. G. A. Lukas on "Colonial Geography in Austrian Higher Schools." In addition, reports were to be made on the work, during 1909-1912, of the Permanent Committee on Geographical Teaching by its chairman, Prof. Heinrich Fischer, and, by Prof. Penck, on the position to be taken by the Geographentag towards the German Committee on the Teaching of Mathematics and Science.

The following papers were to be read dealing with the history of geography: "The Survival of Erastothenian Units of Measure," by Prof. R. v. Scala; "The History of Geography, and Historical Geography," by Prof. S. Günther; "The Transmission to Posterity of Manuscript Maps of Ptolemy," by Prof. Joseph Fischer; "On the Beginnings of the Knowledge of the Compass in Europe," by Dr. A. Hennig.

The usual report of the "Zentralkommission für wissenschaftliche Landeskunde von Deutschland" was also to be presented by Prof. Friedrich Hahn and a resolution submitted to the meeting urging the preparation by the Commission of a physical atlas in which should be represented regions of special geological and climatological interest in Germany.

In connection with the meeting an exhibition was to be given in the Museum Ferdinandeum dealing with the historical geography of the Tyrol. It was to contain old maps of the Tyrol, old plans and views of Innsbruck, globes and surveying instruments which belonged to the Tyrolean surveyors, Peter Anich and Blasius Hueber, and relief maps of parts of the Tyrol.

In addition, execursions were to be made to the regions of geographical interest so readily accessible from Innsbruck. The main excursion under the leadership of Professors Blaas and v. Wieser, to last three days, was to have the southern Tyrol for its field. After a short visit to the basin of Brixen, Bozen was to be used as a center for excursions in the vicinity. These were to include visits to the Eppan moraine and an ascent of the Mendel Pass on the western side of the Adige valley, and, to the northeast of Bozen, a visit to the plateau of the Ritten with its splendid panorama of the Dolomites. Secondary excursions were planned, in the vicinity of Innsbruck, to the new Karwendel Railroad, which affords direct access to the Inn valley from Munich instead of by the detour via Kufstein, to the mouth of the Ötztal, and to the Berg Isel.

The Innsbruck meeting is thus seen to be the equal of its predecessors in the breadth of its conception of our subject and, therein, representative of the German school of geography. W. L. G. J.

The Oldest Map of Lombardy. According to R. Almagià (*Riv. Geog. Ital.*, March-April, 1912), the oldest printed map of Lombardy hitherto known was that found in the "Raccolta Lafrery" in the Biblioteca de' Bardi at Florence, bearing the date of 1556, although no printer's name appears on it. It seems, however, that an earlier map exists in the so-called "Raccolte Lafrery" owned by the Vittorio Emanuele Library in Rome. This map is printed from a woodcut measuring 53.2 x 39.5 cms, and is bordered by a single straight line on all sides. On the upper left hand the name "LOMBARDIA" is inscribed. The lower left hand corner contains the following inscription: NOVVM. LANGOBA | RDIE. OPVS SVNMA | DILIGENTA (sic). INMPR | ESSIT. VENETIS. LVC | AS ANTONIVS. DE R. | VBERTIS. APDE. PON | TE DIVE. MOISES. CV | M M. GRATIA.

No scale or coordinates are given. The map shows the stretch of land between Milan and the Adriatic sea. Pictures of military exploits of the period and bearing dates ranging between 1494 and 1515 are represented. This leads the writer to assume that the map was printed sometime between 1515 and 1525. The latter date is that of the battle of Pavia, which, he claims, would surely be mentioned on account of its importance.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

The Revolutionary War and the Military Policy of the United States. By Francis Vinton Greene. xxi and 350 pp. Maps, index. Charles Scribner's Sons, New York, 1911. $2.50. 9 x 6½.

Military campaigns have considerable value for the teaching and study of geography. Their response to topographic features is usually clear and the military movements have much interest in themselves. The book under review will be welcome to geographers as a concise readable description of the Revolutionary campaigns. The copious maps, based on those appearing in Avery's "History of the United States and Its People," add to the value of the book.

The author, however, shows but little grasp of the physiography of the regions in which the armies maneuvered. For example, in describing the campaigns in New Jersey, there is but little description of the Piedmont, Great Valley or glaciated regions upon which Washington for the most part operated, nor the Coastal Plain upon which the British preferred to move. The campaigns themselves are briefly and clearly described. The lack of geographic material is, perhaps, fortunate from a teaching standpoint in that it compels the student to work out his own correlations. One exception to this is the author's graphic description of the Hudson-Champlain Lowland (page 101). Such descriptions of other regions would add to the value of the book for the general reader. F. V. Emerson.

SOUTH AMERICA

South America To-Day. A Study of Conditions, Social, Political, and Commercial in Argentina, Uruguay and Brazil. By Georges Clemenceau. xii and 434 pp. Index. G. P. Putnam's Sons, New York, 1911. 8½ x 6.

Salvador of the Twentieth Century. By Percy F. Martin. xvi and 320 pp. Map, ills., index. Longmans, Green & Co., New York, 1911. $4.20. 8½ x 6.

Clemenceau's book is one to be glad of, though it does not cover South America. It is a bright realistic picture of many aspects of life in several parts of the Argentine Republic and Brazil and at Montevideo. We should be glad of it because it is literature; agreeable, artistic writing; writing that builds up pictures in the mind whether the reader will or no. Clemenceau's views on geography might not be valuable. Some rare comment on wind or a bit of navigation is apt to be a bad shot, but there is almost none of it. Of blemishes, publishers and proofreaders have put in more: Surely Calval (p. 321) is Cabral, only Cabral did not touch Santos, *Perchero* and *upchero,* at pp. 138 and 239 for *puchero, Nicterchy* (327) for *Nictheroy, expects* (212) for *inspects, prize* for *price* (216), *vimdas* for *viudas* (268), *learage* for *leafage* (346)—all unworthy of the traditions of English or American publishing. But these are no sample defects, they are almost all of them. What the camera sees, the surface of things in the light, what we would enjoy seeing if we went to a new land and had the entrée everywhere, that is what Clemenceau's easy pen portrays. He wants, he says, to make us wish to go and see, too. He does. He knows no Spanish, he can converse only with those who possess French, French culture is his touchstone, ever at hand; every German or English accomplishment puzzles him: why is it not French? He is royally treated everywhere, is gracious in his recognition of this, but preserves his dignity and has courteous, independent judgments to offer on what his excellent eyes have seen. He knows how to praise American progress unstintedly while recognizing its limitations. He perceives the almost fabulous wealth of the Argentine land and Southern Brazil and yet the present-day life with them is a gamble. Admirably he brings out the strength in each people or its upper classes, the only ones he could converse with. (That everyone speaks French in "Saint Paul," as this book calls São Paolo, is a figure of speech.) His pages on the invigorating air of the Pampas and the exuberant beauty of the Brazilian forest take one across the equator.

Martin's book is a singular contrast to Clemenceau's. Quite as little a scientific geographic study, it goes very much more into facts and figures. Yet it fails utterly to convey the clear impressions that the French statesman has known how to convey in his seemingly less laborious pages. The photographs, nevertheless, do give a good idea of the scenes depicted. Certainly, there are many facts about Salvador here. Financial notions can be gotten out of the whole perhaps easier than geographic ones. It is hard for a reader to get clear concepts here of either places or people. Trade relations and commercial methods, however, are well described. MARK JEFFERSON.

Trabajos del Cuerpo de Ingenieros. Encargado del levantamiento del Mapa Fisico y Politico de Venezuela. Appendice a la Memoria del Ministerio de Relaciones Interiores. xxxiii and 486 pp. Maps.* Imprenta Bolivar, Caracas. 1911. 10½ x 7½.

Stimulated by a desire to publish a new physico-political map of Venezuela, as a part of the centennial celebration of Venezuelan Independence, that government (in 1909) authorized the surveys which are embodied in this volume. The time at the disposition of the topographical engineers was too short for the completion of the work by 1911, but a fair beginning has been made and noteworthy results are now at hand. Already about two square degrees, or 21,000 square kilometers, have been triangulated and mapped topographically. The finished tract extends east and west of the well-known port of La Guaira about one degree, includes Valencia and Caracas, and extends inland to Calabozo, latitude 9° south. In addition, the positions of nearly 150 places scattered over 4½° of latitude and 12° of longitude have been determined astronomically. The scale of the completed map is to be 1:1,000,000.

The progress of topographic work in Venezuela again calls our attention to the unequal value of the data on which existing maps of that and neighboring countries are based. The boundary between Venezuela and British Guiana was laid down accurately by a British-Venezuelan Commission according to the terms of the treaty of 1899. From the Salto de Maturaca to the summit of Roraima the boundary has been run by a Brazilian Commission. The great region of the Upper Orinoco, and the Casiquiare-Negro province, is still without any save primitive maps,—those of Cadazzi, Humboldt, Schomburg, and the Spaniards, modified especially as to longitude by the work of international commissions. Poorly mapped though they are, these remote frontiers are better known than some of the regions which they enclose. The great district between the Orinoco and the Guiana frontier is especially unknown and contains natural resources which should be a stimulus to immediate exploration. The present volume is purely statistical and descriptive; the maps are to appear later.

ISAIAH BOWMAN.

AFRICA

The Baganda. An Account of Their Native Customs and Beliefs. By the Rev. John Roscoe. xix and 525 pp. Ills., plans, index. Macmillan & Co., Ltd., London, 1911. $5. 9 x 6.

The close reading of this valuable work recording with every note of extreme accuracy the life of the men of once bloody Uganda leaves a sense of unsatisfaction. It is only when a turning of the pages once again to find the source of this feeling discloses the ascription to Professor Frazer that it becomes apparent what is the trouble with the work. It lacks spontaneity in treatment. That, it seems, is the crying evil in present British ethnology; there is a conscious effort to write into accord with the "Golden Bough." We have commented on the same defect in notices of work done in Papua and among the Veddas, yet, above all who put pen to paper, the field ethnologist should remember the classic maxim "nulius addictus in verba jurare." Yet the author of these somewhat arid studies of the Baganda had a most remarkable opportunity and a free hand until he tied his own wrists. He was on the plateau west of the great African lakes before European influence had made itself felt, he was in fact the forerunner of that influence and laid the foundation of a work in which religion has led a savage folk to a satisfactory culture. He reached this interesting people even before the so-called Arab culture had come among them on the slave trails. We do not for a single moment doubt the accuracy of his observation nor the veracity of his record, yet we cannot escape the feeling that every item is carefully planned to fit into some scheme of ethnologic science. The record would have done the Baganda better service if it had ceased to regard them as so much material for the "Golden Bough," and better service would have been done to Professor Frazer's work by an absolutely unconditioned study of this once great African people. Not until we reach the chapter on folklore do we feel free from the trammel. It is very brief, only thirty pages. Mr. Roscoe has preserved fragments of the Brer Rabbit mythos. In Baganda tales the characters are the Leopard and the Hare. We are surprised that no more was discovered or recorded, for the White Fathers have found among the neighboring Basumbwa a complete epos of the rabbit, Nakami ye Ngaraganza, including the tar baby itself, much of which was translated some four years ago in a New York newspaper with most valuable and satisfactory results. WILLIAM CHURCHILL.

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* Listed under "Venezuela," *Bull.*, Vol. 43, 1911, p. 876.

Land and Peoples of the Kasai. Being a narrative of a two years' journey among the cannibals of the equatorial forest and other savage tribes of the southwestern Congo. By M. W. Hilton-Simpson. xx and 356 pp. Ills., map,* index. Constable & Co., Ltd., London, 1911. 16s. 9 x 6½.

Interesting though this work is, we are precluded from admitting it to independent estimate, a natural result of the circumstances under which it came into existence. It is a little unusual; the author has in effect gathered together a running report and to a certain extent a summation of the expedition of another man, an expedition with which he was permitted to associate himself, yet in which he had no particular part assigned. For the scientific results we are obliged to await the publication thereof by Torday, the head of the expedition, when he has had the time to study them out and prepare them in orderly array. The outlines of the geographical discoveries have already been recorded and are readily accessible to students. (*Geogr. Journ.*, Vol. 36, 1910, pp. 26-57.) Mr. Hilton-Simpson provides an essentially popular narrative, a sketch of personal impressions which shall serve as introduction now and later, as supplement and commentary upon Torday's researches.

In its way a good end is satisfactorily served by reason of the fact that the author, a traveler of wide experience already, was introduced under such excellent leading into jungle experience, his former travels having been most largely prosecuted in desert and arid lands. Above all exploration the threading of jungle calls for the unjaded eye. We recall the sense of being smothered under leafy blankets, of being parboiled in hot steam, of being shut in by giant boles of trees and serried walls of bamboos and other giant grasses, as the persisting character of work in the almost carboniferous tangles of the equatorial regions. Above all recollections is the feeling of narrowness, never a wide prospect to stir geographical zeal, nothing more accomplished and nothing more accomplishable than threading narrow tapes of knowledge through the unknown. It is only the newcomer who can report the jungle life before its grip has caught him in repression. This it is which gives Mr. Hilton-Simpson's narrative its undoubted charm. He has seen and not yet has he become jaded by the tangle of things to see.

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* Copy of this map listed under "Belgian Congo" in *Bull.*, Vol. 42, 1910, p. 874.

The terrain covered by this reconnaissance lies midway between the Congo mouth and Tanganyika, the greatest attention having been devoted to the Sankuru affluent of the Kasai from Basongo at the point of union as far as Batempa at a point a few miles higher up the stream than Lusambo. Leaving the Sankuru at Bena Dibele, the expedition penetrated the forest to Kole on the Lukenie and followed that stream for some distance to Lodja. The Lukenie parallels the Sankuru and Kasai at some little interval to the north; finally it joins the Kasai system just before reaching the Congo. From Lodja a journey northward to Lokesu and beyond brought the party into yet another system, that of the Chuapa, which reaches the Congo at Equatorville. The story of the incidents of the march is well told, the author has observed with interested eyes the life of savage folk never before seen, he has succeeded most happily in presenting a pleasant record. WILLIAM CHURCHILL.

The Great Plateau of Northern Rhodesia. Being Some Impression of the Tanganyika Plateau. By Cullen Gouldsbury and Hubert Sheane. xxiii and 360 pp. Map, ills., index. Longmans, Green & Co., New York, 1911. $4.50. 9½ x 6.

On this plateau, 4,000 to 6,000 feet above sea level, lying between 8° and 12° S. Lat., and 30° and 34° E. Long., live a number of tribes that have maintained their distinctive characteristics. This book has for its aim to depict the conditions of the country, and the manners and customs of the people, while they are still primitive—"before they fade and are forever obliterated by the corrosive contact of civilization." The discussion opens with the rites and customs of succession practiced by the most virile of the tribes, the aristocracy of the country, the followers of the Crocodile Kings, and then describes the native customs, especially in relation to justice, the formal festivals of birth, initiation, marriage and burial, and the social life of the villages.

Closely related to the main theme are discussions of the missionary movement in the district and of the future prospects of the territory. In the former, a well-balanced view of the status and work of the missionaries is presented, and the authors have moved safely along the middle road between carping criticism and over-zealous praise. Here, unlike many other places in Africa, Mohammedanism has not become the foe of the Christian missions, mostly because of the inaccessibility of the stations; but as time goes on, the encroachment of the religion of the North, which appeals curiously to the African native, will surely occur and the field of the struggle between Mohammedanism and Christianity will be enlarged.

In the final chapter, the authors summarize their views as to the possibilities of this distant land when it is made accessible by railroads. After this achievement, capitalists may be able to make the Nyassa-Tanganyika plateau a much valued corner of the Empire. ROBERT M. BROWN.

The Geology and Geography of Northern Nigeria. By J. D. Falconer. xiv and 295 pp. Maps,* ills., index. Macmillan & Co., Ltd., London, 1911. $3.25. 9 x 5½.

These results of Dr. Falconer's work, while in charge of the Mineral Survey of Northern Nigeria, may well be considered as the nucleus of an eventually more detailed investigation of the Protectorate. Although the title implies that part of the book treats of the geography of the region, the chapter on which this designation is based deals solely with the surface forms and the hydrography of the district. In the main, the author has presented his subject in the form usually adopted by geologists. The minuteness with which he and his collaborators describe the topography of the region evinces both their painstaking care and an ample realization of the extreme importance of familiarity with surface conditions as a preliminary aid to subsequent geologic research. So many workers overlook this that its consideration still deserves a special mention of praise.

The same care appears to have been devoted to the microscopic determination of the crystalline rocks, the texture and structure of which are discussed in the second chapter. The value of the data collected by Dr. Falconer is readily understood when it is recalled that the districts he has visited belong to a zone of transition between the fully developed deserts of Northern Africa and the well-watered regions of the equator.

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* Listed under "Northern Nigeria," *Bull.*, Vol. 44, No. 4, April, 1912, p.317.

The stratigraphic notes forming the bulk of the book's material will doubtless be used to advantage in the eventual solution of the problems in the stratigraphy of this hitherto ill-known region. The author and his collaborators deserve due credit for the attempt made to correlate the evidences of Tertiary disturbances in Northern Nigeria with the far-reaching phenomena now known to have taken place farther north at the same period. At the same time the sequence of events in the course of the Tertiary eruptions is not taken up with sufficient detail. The mere hinting at the limits of petrographic provinces is premature at this stage of our knowledge of the erstwhile igneous activity prevailing in that region. We cannot refrain from noting that practically no reference is made to the work of American geologists in the Great Basin region where the manifestations of Tertiary vulcanism have been studied in detail.

Under the caption of Appendix 1 some very meager notes of the mineral resources of the Protectorate are crowded into some six pages of large type text. This is regrettable. In the first place, because data of economic value have nowadays become the great stimuli of scientific research. Secondly, because of the high value of mineralogic types in the determination of metalliferous provinces where the presence of either a single mineral or of a group of minerals often furnishes the key to the solution of many an important regional problem. The two-fold impressions gathered from the text of Dr. Falconer's work is that, while the region gives evidence of its being economically important if attention is bestowed upon the geologic data given, yet, on the other hand, such is not the case were one to base himself on the paucity of material used in the compilation of the report on mineral resources.

A second appendix is devoted to the enumeration of Upper Cretaceous fossils found, carefully prepared photographic reductions of which are used as illustrations. Considering the work as a whole, it may be asserted that too much praise cannot be given to the author and his collaborators for the splendid pioneer work they have presented in this volume. LEON DOMINIAN.

ASIA

Atlas zur Geschichte der Kartographie der Japanischen Inseln, nebst dem Holländischen Journal der Reise Mathys Quasts und A. J. Tasmans zur Entdeckung der Goldinseln im Osten von Japan i. d. J. 1639 und dessen Deutscher Übersetzung. By Paul Graf Teleki. XII and 184 pp. Numerous maps in text with twenty full-page map reproductions. Budapest, 1909.

The author includes under the term "Japanische Inseln" all those which now constitute the Empire of Japan. His work, as stated above, embraces, not only the history of the cartography of this region, with numerous reproductions of early maps, but the accounts of the journeys of Quast and Vries in the year 1639 and 1643, which accounts occupy about one-half of the entire atlas. Though the author confesses to a want of knowledge of the Japanese, Chinese, Spanish, and Portuguese languages, he has given us a remarkably fine piece of work which, he expresses the hope, will encourage others to make further research in the same field. *Part I* treats especially of "Zipangu," first knowledge of which, in Europe during the Middle Ages, appears to have been derived from Marco Polo. That knowledge, however, is shown to have been very inexact in a chapter treating of the cartographical representations of the island before the discovery of America. Its first representation appears in the Catalan map of 1375, based upon the word of the great Asiatic traveler. Though not bearing the name Zipangu, a legend on this map tells of the existence of rich islands in that locality. On the Fra Mauro Map of 1459, it appears under the name "Ziripagi," and it is likewise represented on the Behaim and the Leon globes, as well as on the Toscanelli map, assuming, as does the author, that there was a Toscanelli map, which assumption is probably contrary to fact. An interesting chapter treats of the influence of the discovery of America on the knowledge of Japan and its cartographical representation, at the time of which discovery the information possessed still rested on the word of Marco Polo. In the efforts to determine the relation of the East Asiatic coast to the West coast of America, Japan is represented now nearer one coast, now nearer the other, being moved about in the Pacific much as were the fabulous islands of an earlier day in the Atlantic, until the visit of the Portuguese near the middle of the sixteenth century.

Sixty-eight maps are referred to and described between 1502 and 1550, in which there is representation of the island, but the confusion of cartographers is particularly noted, beginning in the second half of this period. With some of these cartographers, it was laid down as a part of Asia, with others it was identified as one of the West India Islands.

Part II opens with a consideration of the discovery of Japan by the Portuguese in the year 1542, and of the accounts of their discovery and subsequent relations with the Island as given by Galvano and the Jesuit missionaries who accompanied and followed Francis Xavier. Among the new maps of the region which are of Portuguese origin the author gives full description and explanation of such important publications as are those of Diego Homen of the years 1558, 1561, 1568, of Vaz Dourando, of Lazaro Luiz, and of Henricus a Langren, whose map appears in the *Itinerario* and *Reys-Geschrift* of Linschoten. In this last named work we find an account, fully analyzed by Graf Teleki, of the transplanting of Portuguese knowledge to Holland, Portugal failing to keep in control her attempted trade monopoly with Japan.

In the closing years of the Sixteenth Century, the Netherlands became the center, not only of great commercial enterprises embracing within their scope the regions of the Far East, but also the great center of the reform movements in map-making. The author refers to the work of Mercator, Ortelius, Jode, Hondius and Langren, with special reference to their representations of the regions here in question. In that part of his work in which Graf Teleki calls attention to the journeys of Quast and Vries, he gives the original record with a parallel German translation. In his concluding chapters we find adequate treatment of the discoveries of the Russians and of their contribution to the geographic knowledge of Japan, with a record of the gradual acquaintance with the other islands of the empire to north and south, embracing Formosa and the Kuriles. To his work twenty full pages of splendid map reproductions are added, covering the period from 1492 to 1811, and a valuable bibliography. Graf Teleki's atlas is one of superior excellence, a model for those who have in contemplation a history of the cartography of any other single country.

E. L. STEVENSON.

A Journey in Southern Siberia. The Mongols, Their Religion and Their Myths. By Jeremiah Curtin. xiv and 319 pp. Maps, ills., indexes. Little, Brown & Co., Boston. 1909. 3.9 x 6.

Without being in any sense a philologist, the late Jeremiah Curtin was a facile linguist. His acquaintance with sixty languages is somewhat of a marvel to those who do not know how easy a new language is of acquisition by such as have passed their tenth language. This record of sixty languages means no more than that Mr. Curtin was equipped with a supply of tools beyond the provision which most literary men have. A tool-chest can be valued only by the product exhibiting the use made of its equipment. Frequently the polyglot student collects new languages much as a squirrel collects nuts; Mezzofanti, for a lucid instance of the case in point, is best remembered for his knowledge of fifty languages, yet his literary remains are comprised in but a single item, and that stupid.

Curtin is best recalled as the translator of Sienkiewicz, a service now by no means so highly esteemed as when that Pole was a literary fashion. This little volume is of far more worth, for in it we have the results of Curtin's utilization of one of the obscurer languages of his acquisition, that of the Buriat, the little-known Mongols of Lake Baikal, on three sides of which and on its only island, Olkhon, they are now settled. The results are so valuable, the record is so intimate, as to move to great regret that Mr. Curtin did not more employ his linguistic equipment for independent product.

The Buriat have received Russian study ere this, but it has altogether been such study as would suggest itself to the political adminstrator dealing with an inferior civilization and the government problems which it offers. This is the first general study of the drones of the Mongol race who were stay-at-homes in the great era when their kind swept along to the conquest of Asia and to the delivery of a threat which caused Europe to quail. Supported by a most considerable mass of newly collected legend, this posthumous narrative will long stand as the standard ethnographic authority upon this interesting folk.

W. C.

Palestine. Depicted and Described by G. E. Franklin. xx and 219 pp. Map, ills. J. M. Dent & Sons, Ltd., London. 1911. 10s. 6d. 9 x 6.

For any work upon this theme and of this general character the standard of comparison must long remain Thomson's "'The Land and the Book." That was a work of the best scholarship of its day, of the utmost reverence in the treatment of holy scenes. It is one of the classics of literature. In the half century which has elapsed, Palestine has been far more disclosed. Our knowledge is based upon the accurate determinations conducted by the Palestine Exploration Fund. The result appears in this volume; many things that in Thomson's time were uncertain have now been made clear, many things then unknown have come to light, the accuracy of photography affords us truer pictures than the most reverent pencil, and this work, if for nothing other, is welcome by reason of its 376 views of spots famous in sacred history.

From the essential conditions of its theme any work on Palestine must be far more than a guidebook to the traveler or a handbook for the reader. It cannot help being a commentary on Scripture. Mr. Franklin has preserved a safe path through intricacies over which many theological battles have been fought, a task of peculiar difficulty for the geographer of the Holy Land, since even so simple a matter as place determination not infrequently engages with basic matters of several confessions of faith. In minor matters the author might have shown himself to better advantage as tolerant of error made by earlier travelers. The careful historian will not always dismiss quite so cavalierly the consensus of ancient tradition. Despite these minor blemishes, the volume should be an interesting companion for such as make the pilgrimage to Palestine and it will certainly prove of value in the library equipment of evangelical pastors.

WILLIAM CHURCHILL.

EUROPE

Turkey and Its People. By Sir Edwin Pears. vi and 409 pp. Index. George H. Doran Co., New York, 1912. $3.50. 8½ x 5½.

None of Sir Edwin Pears's works could, perhaps, better reveal the great value of his Oriental researches to English-speaking students than this accurate description of the heterogeneous components making up the Ottoman population. Those of us who have had the advantage of listening to his lectures in Robert College well remember how we marveled at the thoroughness of his knowledge of matters pertaining to the East. The same impression is felt on reading his book. This is not a mere traveler's tale. Rather, the sum total of almost half a century's experience is set forth in these 400 pages. The writer has known, often intimately, a great many representatives of every race in Turkey. He has learned almost to become a Turk when in the company of Turks, or an Armenian when with Armenians, and generally to adapt himself to the environment conditioning the lives of the inhabitants of his place of residence.

It is particularly in describing the Greeks of the Turkish Empire that Sir Edwin is abundantly equipped. His descriptions bring to light the Greek type as evolved from the Byzantine. The transformation the race has undergone under the influence of its Turkish masters is also well shown. His reference to Greek communities which, while preserving their religion, have lost their own language and speak nothing but Turkish, is an excellent example of the influence one race may exert on another even though they have no social intercourse within the same city walls. In this case, religion has been the only barrier to complete fusion with the Mohammedan element. Sir Edwin's remarks on the Greek Church in this respect are pertinent. His exhaustive study of this subject has enabled him to detect certain traces of paganism in the Eastern churches. His notes relating to this matter will interest students of Byzantine times and also constitute a good example of the latent force of former associations that influence later generations.

The description of the dwellers of Asia Minor is prefaced by an accurate review of the physical conformation of the peninsula. The isolated communities and the nomad races thus stand out partly as products of geographical factors. It is interesting to note how fundamental traits due to the environing physiography are often far more striking than the recognized differences of race or religion into which human types are more commonly classified.

The chapter on the development of Islam contains very timely comment on the gradual infusion of a strain of western reasoning into the Mohammedan mind. In the broad belt extending from the westernmost shores of Africa as far east as the Philippine Islands, the tenets of the Koran are being reviewed and interpreted in the light of more advanced conceptions. The influence of this evolution of the Sherryat on Turkish judicial procedure could not have escaped the attention of so eminent a jurist as the author is known to be. His very valuable commentary on the Capitulations and the standing of foreign communities is the result of 40 years of careful deliberation. No other lawyer, perhaps, can boast of so wide an experience.

The book concludes with a chapter entitled "Signs of Improvement in Turkey." This is a résumé of the general progress accomplished in the country from 1820 to our day. The dominant note of this chapter is the fact that civilization has made enormous strides throughout the land notwithstanding long periods of misgovernment under despotic rule. LEON DOMINIAN.

POLAR

In Northern Mists. Arctic Exploration in Early Times. By Fridtjof Nansen. Translated by Arthur G. Chater. Vol. 1, xviii and 384 pp. Vol. 2, xiii and 420 pp. Index. Maps, and ills. in each. F. A. Stokes Co., New York, 1911. $8. 10 x 8

There is a wealth of material in these two stately volumes which will fairly astonish those to whom the name of Nansen suggests little south of the great circumpolar ice. The purpose of the work is to set forth the slow stages by which our culture, a narrowly restricted product of the Mediterranean, first discovered and in the end occupied the northern lands of Europe and thence was led onward to the discovery of the unknown world over the sea of receding terror.

We know of no authority who has made such a careful study of Pytheas, that merchant adventurer out of Massilia, who was the discoverer of the true extent of the British Isles and who passed beyond Scotland and the Orkneys to some Thule beyond. Dr. Nansen has reinstated him, has done more, has set him in the position of the first geographer of northern Europe. Another authority whom time has flouted is in the same careful analysis restored to grace, that Ottar or Othere whom King Alfred believed. It is something accomplished to have cleared away the neglect under which these two early voyagers have been buried.

We judge that on this side of the Atlantic the greater interest of this work will lie in Dr. Nansen's treatise on the Norse discovery of America. This theme has been polemic and battle has fiercely raged about its every detail, battle not always fairly waged. We observe that the author treats with a neglect that cannot be unstudied the proposed runes of the Dighton Rock, as well as the skeleton in armor and the Newport mill; the more recent runic stone of Minnesota he denounces as modern forgery.

Leif the Lucky, son of Eric the Red, was long a belief even of Americanists. It could scarcely be denied in safety that he discovered Wineland the Good. The only point as to which debate was permissible was the setting of Wineland upon the maps. It was possible to maintain that Wineland was Newfoundland, it was possible to identify it in Nova Scotia, on the coast of Maine, even as far south as Cape Cod and Narragansett Bay. Somewhere there is a statue to this hardy voyager. Norumbega yet remains a name.

In those days of conflict it was expected of every Scandinavian that Leif the

Lucky should be an article of the most devout faith, even the stoutest of American opponents was willing to concede the voyage of Leif's long ship, the only disagreement was upon the precise goal in America which he reached. But Dr. Nansen, so proud of the history of his great forefathers that he will tolerate not the slightest taint of fiction to draw from their proper credit, destroys the discovery of Wineland with consummate analysis of saga and other legend. After his study we need no longer concern ourselves with debate as to Leif Ericson's landfall. It was nowhere on the American main, Wineland the Good is nowhere on this earth. It is the port of Cloudcuckooland, it is filmy myth. The argument to this destruction of Wineland is slowly elaborated in these volumes. Not an item in the saga account is neglected, each least particular in the narrative is carried back to its source in the mass of folk mythology and it is shown how each such item came into the possession of the northern makers of sagas. It is a powerful case of analysis. Not a wisp of Wineland is left to perplex our northeastern geography. Even the wild men of Wineland have had to go, the Skraelings; we shall miss the Skraelings. There was something attractive about those superhuman savages, something that made the flesh creep even to read of them, all tending to set in higher glory this Leif the Lucky.

William Churchill.

GENERAL

Meteorology. A Text-Book on the Weather, the Causes of its Changes, and Weather Forecasting for the Student and General Reader. By Willis Isbister Milham. xvi and 549 pp. Maps, ills., index. The Macmillan Co., New York, 1912. $4.50. 9 x 6.

We have here the results of Professor Milham's experience in teaching during the past eight years at Williams College, supplemented by study at the Weather Bureau in Washington, where he went to familiarize himself with the Government meteorological work. This combination of college teaching and of a knowledge of practical meteorological work has resulted, as might easily have been predicted in the case of the author of this book, in the production of an excellent text, well-arranged, up to date, and very strong on the bibliographic side.

There has been increasing need of a text-book of meteorology which should present the most recent developments of the science, and which should, at the same time, give the reader and student a well-selected list of references to the literature, which has been growing with such rapidity that even most experts can no longer hope to keep up with it. Professor W. M. Davis's "Elementary Meteorology" is now fifteen years old, and is already behind the times in several respects, although it has not lost the commanding position which it has held by reason of the remarkable clearness of its presentation, the logical development of its treatment, and the emphasis which it lays upon the correlation of the different meteorological phenomena. Its importance is clearly shown by the fact that Professor Milham is much indebted to it in his own work. Those who know the "Elementary Meteorology" well will recognize the points of similarity. We say this without meaning in any way to detract from the importance of Professor Milham's own book. To our mind, no writer of a text-book of meteorology, intended for purposes of instruction, would do well to attempt to cut himself entirely loose from the general plan marked out by Professor Davis.

Professor Milham has given us exactly what we have been needing for years past, and we commend his Meteorology to the "general reader" and to the teacher and student. Systematically arranged, with summaries at the beginning of each chapter, marginal headings, questions, topics for investigation and bibliographies, the present status of the science is clearly summarized and the reader is guided to such further study as he may have the opportunity to make. Those who have themselves endeavored to keep up with the recent advances in meteorology will appreciate the wide range of Professor Milham's reading. His text is unusually complete; in fact, the body of the material is so solid that in some places it might almost seem to be almost too solid. But the mistake, if there be a mistake, is surely on the right side. A solid text is far better than a slim one, in such a book. Probably few of his readers will find it necessary to go beyond his text for the information which they are seeking. And this is a distinct advantage in the case of a text-book which we hope, and believe, will have extended use among teachers.

Professor Milham's desire to present the current views of meteorologists leads him in some cases to outline several theories (as, *e. g.*, in the case of the theories of extra-tropical cyclones). He gives the arguments *pro* and *con* very clearly and succinctly, but the student may perhaps wish that something more definite had been given him. Most students of elementary science do not like to argue things out for themselves. What they want is a definite statement which they may take as authoritative. This is not a very encouraging frame of mind, but it is very common. Again, in a few cases, our author does not seem to us to have given, with sufficient clearness, the generally recognized explanation of the phenomenon which he is discussing, *e. g.*, in connection with the relation between isobaric surfaces and isobaric lines, the diurnal variation in wind direction, and the formation of the tornado funnel cloud. Yet we have no hesitation in saying that Professor Milham has, on the whole, avoided giving too great detail on the one hand, and too incomplete an outline on the other. The discussion of the deflective effect of the earth's rotation and of its application to the circumpolar whirl, and of the general circulation (surface and upper), will perhaps strike others besides the reviewer as being among the less effective portions of the text, while the sections on weather prediction are admirably done. There is an excellent, clear, and complete account of weather forecasting, which will be found extremely useful. A generous supply of charts, including several carefully selected illustrative weather maps, adds greatly to the value of the book. A few of the illustrations are not always as clear as could be wished, as, for example, the figure of a thunderstorm (p. 324), of the distribution of the meteorological elements around tropical and extra-tropical cyclones, and around anticyclones (pp. 268, 284, 295).

The volume itself is a singularly clear and effective presentation of the present status of meteorological science, in a form which renders it extremely useful for teaching. We feel sure that Professor Milham has given us a text which will contribute greatly to the advance of meteorological knowledge in this country. R. DeC. Ward.

The Effect of Topography and Isostatic Compensation upon the Intensity of Gravity. By John F. Hayford and William Bowie. Special Publication No. 10, Coast and Geodetic Survey, 1912. 132 pp. Maps, ills., index. 11½ x 9.

The introduction of isostasy in the determination of the figure and size of the earth from observed deflections of the vertical resulted in a marked increase in the accuracy of the values deduced. It was logical that isostasy should be considered in the reduction of gravity observations in order that a corresponding increase in accuracy of the shape of the earth might be obtained from these data.

A preliminary report on the reduction of fifty-six gravity stations in the United States, by the new method, was made to the International Geodetic Association at London and Cambridge in 1909 by Hayford. The present publication is a complete report on the reduction of eighty-nine gravity stations in the United States.

By the new method a correction is applied at each station for the attraction of the topography of the whole earth and also a correction for the isostatic compensation of the topography in addition to the correction for the height of the station above sea-level. The compensation is assumed to be complete and uniformly distributed from the surface to a depth of 113.7 kilometers. This was the most probable limiting depth as determined by the first investigation of the figure of the earth and isostasy from measurements in the United States. The better value of 120 kilometers, obtained from the second investigation of the figure of the earth and isostasy, was not available at the time the tables were computed for the gravity reductions.

The methods used in applying the effect of the topography and its compensation are fully described and the necessary working tables are given. In fact, all the data are given that are necessary for making reductions at any gravity station in the world.

The procedure at each of the gravity stations was to compute the theoretical gravity for the latitude of the station in question by the Helmert formula, correct this for the elevation of the station above sea level and then apply the correction for the topography of the world and its compensation. The resulting theoretical value is then compared with the actually observed value of gravity at the station. The difference between the computed and observed values is the anomaly which indicates a departure at that station from the assumed density of the earth's surface and of the computed excesses and defects of density in the crust to the depth of compensation.

A comparison is made of the new method anomalies in size and sign, with the anomalies given by the free air and Bouguer methods and the result is in practically every case in favor of the new method.

The eighty-nine stations in the United States were arranged in groups with reference to their relation to topography. The groups are: 16 coast stations; 18 stations near the coast (within 325 kilometers); 27 continental stations not in mountainous regions; 16 stations in mountainous regions, below the general level; and 12 stations in mountainous regions, above the general level. The mean without regard to sign of the anomalies at eighty-seven stations (two stations not considered) is .017 dyne or centimeter. For the five groups mentioned above the corresponding means are .017, .020, .018, .012, and .014 dyne, of which no one is much above the general mean of all.

The means with regard to sign for the five groups are: —.004, +.002, +.002, —.002, and +.003 dyne. The general conclusion from the examination is that the anomalies by the new method show no relation to the topography either in sign or average magnitude. It is shown on the other hand that there are decided relations between the anomalies by the two older methods of reduction and topography.

It was found that there appears to be a relation between the surface geologic formation and the size and sign of the new method anomalies. The mean of the anomalies at seven stations on Pre-Cambrian formation is +.019 dyne, with regard to sign, and .026 dyne, without regard to sign. This indicates an excess of material in the crust in the vicinity of these stations. The means with and without regard to sign of the anomalies at 20 stations in the Cenozoic are —.011 and .021 dyne, respectively. This appears to indicate a deficiency in mass in the crust at these stations. It is shown that these anomalies are probably caused by erroneous assumptions as to the density of the surface materials and also to a departure from a state of complete isostasy.

The mean without regard to sign of the new-method anomalies at the eighty-nine stations in the United States is only 0.017 dyne. An anomaly of +0.017 dyne would be produced by an excess of mass corresponding in amount to a stratum about 570 feet thick of density 2.67 (the mean surface density of the earth) with the station at the center of one surface of the disk and the disk of indefinite extent. An anomaly of —0.017 dyne would be produced similarly by a deficiency of mass corresponding to a stratum about 570 feet thick. The gravity observations indicate, therefore, that the isostatic compensation is everywhere so nearly complete that the excesses and deficiencies of mass above the limiting depth of compensation correspond upon an average to a stratum only 570 feet thick. The average elevation of the surface of the ground in the United States is about 2,500 feet, more than four times 570 feet.

The evidence furnished by the new method gravity anomalies in regard to the location and extent of the continuous areas of excess or deficiency of mass in the United States, that is, of under-compensation or of over-compensation, confirms and supplements that given by the observed deflections of the vertical previously considered and published by the Coast and Geodetic Survey in the second publication on the Figure of the Earth and Isostasy. (Written by W. Bowie and reprinted from the *Journal of the Washington Academy of Science,* April 4, 1912.)

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

SOME GEOLOGICAL RAMBLES NEAR VASSAR COLLEGE. By George Burbank Shattuck. 108 pp. Map, ills. The Vassar College Press, Poughkeepsie, 1907. 6½ x 4½. [An admirable little book with a photograph on every other page opposite a page of explanatory text; a map on which each location is noted and text-book references at the bottom of each page of text. Many geological phenomena between Rhinebeck and Fishkill on both sides of the Hudson and as far away as Lake Mohonk are thus illustrated and explained. Dr. Shattuck is Professor of Geology in Vassar College.]

GEOLOGY OF THE CITY OF NEW YORK. By L. P. Gratacap. Third edition, enlarged. x and 232 pp. Maps, ills. Henry Holt & Co., New York, 1909. $2.50. 8½ x 6.

DER NEGER IN DEN VEREINIGTEN STAATEN VON NORDAMERIKA. Von Moritz Schanz. 133 pp. Index. G. D. Baedeker, Essen, 1911. Mk. 1.20. 9 x 6.

PEEPS AT MANY LANDS. CANADA. By J. T. Bealby. vii and 88 pp. Map, ills. The Macmillan Co., New York, 1911. 55 cents. 8 x 5½.

CENTRAL AND SOUTH AMERICA

MISSION DANS L'AMÉRIQUE CENTRALE 1909-1910. Par Maurice de Périgny. (Extrait des Nouvelles Archives des Missions scientifiques, nouv. série, fasc. 4.) 16 pp. Map, ills. Imprimerie Nationale, Paris, 1911. 10 x 6½. [A description of the ruins of Makcun, attributed by M. de Périgny to the early period of Maya civilization.]

IN THE AMAZON JUNGLE. Adventures in Remote Parts of the Upper Amazon River, Including a Sojourn among Cannibal Indians. By Algot Lange. Edited in part by J. Odell Hauser, with an introduction by Frederick S. Dellenbaugh. xx and 405 pp. Map, ills., index. G. P. Putnam's Sons, New York, 1912. $2.50. 9 x 6. [Especially noteworthy for many fine photo-engravings.]

VIAJES DE ESPLORACION I ESTUDIO EN LA PATAGONIA OCCIDENTAL. 1892-1902. Por el Dr. Hans Steffen. 2 vols. Tomo Primero, xi and 409 pp., illustrations, maps and index. Tomo Segundo, viii and 549 pp., illustrations, maps and index. Imprenta Cervantes, Santiago de Chile, 1910.

IN THE GUIANA FOREST. Studies of Nature in Relation to the Struggle for Life. By James Rodway. New, revised and enlarged edition. 326 pp. Ills. A. C. McClurg & Co., Chicago, 1912. 8½ x 5½. [This enlarged edition places even more emphasis than the first issue upon the flora and fauna of the great tropical forest. It is a first rate book for students of nature and every page also will interest the general reader.]

AFRICA

L'AFRIQUE NOIRE. Par Capitaine O. Meynier. Bibliothèque de Philosophie scientifique. 335 pp. Map, ills. Ernest Flammarion, Paris, 1911. Fr. 3.50. 7½ x 5. [The title gives no idea of this work. It is a philosophical résumé and discussion of the human influences, native and foreign, in Africa within the historic period, the achievements and failures of these agencies, and the present stage of development.]

PIONEERS IN WEST AFRICA. By Sir Harry Johnston. 336 pp. Maps, ills. Blackie & Son, Ltd., London, 1912. 6s. 8 x 6. [A popular account of the leading pioneer explorations, including those of Mungo Park, Denham, Clapperton and the Landers.]

THE OPENING UP OF AFRICA. By Sir H. H. Johnston. Home University Library. 255 pp. 2 sketch maps. Glossary. Williams & Norgate, London, 1911. 1s. 6½ x 4. [Gives the outlines of the history of Africa as far as it relates to the occupation and development of the continent or parts of it by various peoples and nations. A good, condensed narrative.]

ON HORSEBACK THROUGH NIGERIA, or Life and Travel in the Central Sudan. By J. D. Falconer. 312 pp. Map, ills., appendix, index. Charles Scribner's Sons, New York, 1911. 9 x 6.

ASIA

Johann Georg Gmelin 1709-1755. Der Erforscher Sibiriens. Ein Gedenkbuch. 146 pp. Ill. Verlag Otto Gmelin, München, 1911. Mk. 7.50. 9½ x 7½. [This volume, issued just 200 years after the birth of Gmelin, commemorates the great work he did during his explorations in Siberia between 1733 and 1743. A botanist, his study of the flora of that region was of special value and the additions he made to knowledge of the geography of Siberia were also very important.]

Sven Hedins Anteil an der Erforschung Zentralasiens. Von Max Rieger. 116 pp. Map. J. P. Bachem, Köln, 1911. Mk. 1.80. 9½ x 6. [An excellent summary of Dr. Sven Hedin's explorations in Central Asia.]

Einführung in die Tropenwelt. Erlebnisse, Beobachtungen und Betrachtungen eines Naturforschers auf Ceylon. Dr. Konrad Günther. x and 392 pp. Map, ills., index. Wilhelm Engelmann, Leipzig, 1911. Mk. 4.80. 8 x 5. [A well-arranged, geographical treatment of Ceylon, with special emphasis on flora and fauna.]

Journaal der Reis van den Gezant der O. I. Compagnie Joan Cunaeus naar Perzië in 1651-1652. Gehouden door Cornelis Speelman. Uitgegeven door A. Hotz. cxv and 466 pp. Map, ills., index. Werken uitgegeven door het Historisch Genootschap, Derde Serie, No. 26. Johannes Müller, Amsterdam, 1908. Fl. 6.50. 9 x 6. [The journey described in great detail in this volume, was from Bender-Abbas at the south end of the Persian Gulf, N. W. to Ispahan, about 500 miles.]

Zionist Work in Palestine. By Various Authorities. With a Foreword by David Wolffsohn. Edited by Israel Cohen. 208 pp. Ills., appendix. Zionist Central Office, London, 1911. 1s. 7½ x 5. [A compendium of information on Zionist work in Palestine, the first in English.]

EUROPE

The Navigable Rhine. The Development of Its Shipping, the Basis of the Prosperity of Its Commerce and Its Traffic in 1907. By Edwin J. Clapp. Map, ills., index. Houghton Mifflin Co., New York, 1911. $1. 8½ x 5½. [The author is Asst. Professor of Trade and Transportation at the School of Commerce in this City. All who are interested in commercial and economic topics will welcome this admirable work, which is marked by orderly arrangement of data, and a clear and interesting manner of telling the story of the great waterway.]

Rome. By W. Warde Fowler. Home University Library. 256 pp. Bibliogr., index. Henry Holt & Co., New York, 1912. 50 cents. 7 x 5. [Tells the story in outline of the advance of the Roman power to the leadership of Italy.]

Sommerträumereien am Meeresufer. [By The Archduke Ludwig Salvator.] viii and 97 pp. Heinr. Mercy Sohn, Prag, 1912. 8 x 5.

The Making of Scotland. Lectures on the War of Independence delivered in the University of Glasgow. By Sir Herbert Maxwell, Bt. xi and 242 pp. Map, plan. James MacLehose & Sons, Glasgow, 1911. 8 x 5½. [A concise expression of the facts leading to the evolution of the kingdom of Scotland by the consolidation of the petty kingdoms that existed in the Eighth Century, and the later fortunes of the kingdom.]

Das Ostseegebiet. Von Dr. Gustav Braun. Aus Natur und Geisteswelt, 367 Bändchen. 108 pp. Maps. B. G. Teubner, Leipzig, 1912. Mk. 1.25. 7½ x 5.

GENERAL

Anthropology. By R. R. Marett. Home University Library. 256 pp. Bibliogr., index. Henry Holt & Co., New York, 1912. 50 cents. 7 x 5. [Ten chapters on the scope of Anthropology, antiquity of man, race, environment, language, social organization, law, religion, morality and man, the individual.]

Prehistoric Man. By W. L. H. Duckworth. Cambridge Manuals of Science and Literature. viii and 156 pp. Ills., index. University Press, Cambridge. G. P. Putnams Sons, New York. 40 cents. 6½ x 5. [As estimates of the length of geological periods are so various the author distinguishes subdivisions of time by reference to animal-types with which human remains have been found associated or by the forms of stone implements.]

THE CHANGEFUL EARTH. An Introduction to the Record of the Rocks. By Grenville A. J. Cole. ix and 223 pp. Ills., index. The Macmillan Co., New York, 1911. 50 cents. 7 x 5. [A good, simply written book calculated to stimulate interest in geological study.]

THE NATURAL HISTORY OF CLAY. By Alfred B. Searle. Cambridge Manuals of Science and Literature. viii and 176 pp. Ills., bibliogr., index. G. P. Putnam's Sons, New York, 1912. 40 cents. 6½ x 5.

MANUAL OF NAVIGATION LAWS. An Historical Summary of the Codes of the Maritime Nations. By Edwin M. Bacon. 81 pp. Index. A. C. McClurg & Co., Chicago, 1912. 50 cents. 7 x 4½. [Presents data covering the inception, growth and readjustment of the Navigation Codes of the leading nations and discusses the policies of competing countries in their efforts to build up and protect their merchant marine.]

ANGEWANDTE PHOTOGRAPHIE IN WISSENSCHAFT UND TECHNIK. Herausgegeben von K. W. Wolf-Czapek. In Vier Teilen. xv and 407 pp. Ills., index. Union Deutsche Verlagsgesellschaft Zweigniederlassung, Berlin, 1911. Mk. 4.50. 10 x 7. [An exhaustive treatise on the application of photography in scientific and technical researches.]

VON POL ZU POL. Von Sven Hedin. viii and 312 pp. Maps, ills. F. A. Brockhaus, Leipzig, 1911. 3 M. 8 x 5½. [A travel book by the renowned explorer, written especially for the young, in which he describes not only the regions which were the scene of his explorations but many other lands as well. In fact he takes his readers around the world and includes Australia and some islands of the East Indies.]

LIFE AND LETTERS OF ROBERT EDWARD LEE. Soldier and Man. By Rev. J. William Jones. 486 pp. Portraits. Neale Publishing Co., New York. 1906. $2. 9 x 6. [A successful effort to depict the life and character of Gen. Lee through his letters and the reminiscences of the author. This portrayal of Gen. Lee as he was, one of the noblest men and greatest soldiers America has produced, has been welcomed by the whole country.]

DESCRIPTIVE CATALOGUES OF MAPS. A paper read before the Bibliographical Society. Nov. 21, 1910. By Sir Herbert George Fordham. 32 pp. Blades, East & Blades, London, 1912. 9 x 7. [Description of engraved maps and reprints of them of Hertfordshire and Cambridgeshire.]

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NEW MAPS

Edited by the Assistant Editor

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given except when region explicitly defined by title. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

NORTH AMERICA

North America. Sketch Map to illustrate a paper on North American Deserts by Prof. D. T. MacDougal, M.A., Ph.D., LL.D. Compiled by Dr.

Forrest Shreve. 1:15,000,000. 51° - 15° S.; 127° - 82° W. 1 color. With diagram: Rainfall at the Desert Laboratory, Tucson, Arizona, 1904-1910. Compiled by Mr. Godfrey Sykes. Accompanies "North American Deserts" by D. T. MacDougal, *Geogr. Journ.*, Vol. 39, No. 2, 1912, pp. 105-123.

[A valuable map if viewed with the proviso that it does not show what its title implies and its legend indicates. What is shown is not, as stated in the legend, the extent of the "desert areas," but, as correctly defined in the text (p. 116), that of the arid region of North America. Even so, it is to be regretted that no differentiation is made between true desert and steppe. Conceptional confusion would be avoided by distinguishing such true deserts as the Great Salt Lake, Colorado and Mohave Deserts from the remainder of the arid region as is done on standard vegetational maps of the region, such as that, for instance, in Bartholomew's "Atlas of the World's Commerce" (Plates 50-51). Nevertheless, the map is of great value in its accurate delineation of the outer boundary of the arid region irrespective of its subdivisions.]

SOUTH AMERICA

Brazil. Mappa do Estado do Ceará. Ampliação parcial do Mappa (Publicação No. 3, Serie 1, G da I. O. C. S.) levantado sob a direção dos engenheiros Horace E. Williams e Roderic Crandall do Servico Geologico e Minerologico [*sic*] do Brasil (Orville A. Derby, Chefe) augmentado com colaboração do Snr. Antonio Bezerra de Menezes. 1:650,000. 2°30′ - 7°50′ S.; 41°20′ - 37°5′ W. 3 colors. Publicação No. 6, Serie 1, G, Inspectoria de Obras contra as Seccas, Ministerio da Viação e Obras Publicas. Oct. 1910.

[Valuable large-scale general map. Relief in brown shading, drainage in blue, railroads and telegraph lines in red.]

Brazil. Mappa dos Estados do Ceará, Rio Grande do Norte e Parahyba com parte dos estados limitrophes pelo Servico Geologico e Mineralogico do Brasil (Orville A. Derby, chefe) sob a direcção dos engenheiros Horace E. Williams e Roderic Crandall.... 1:1,000,000. 2°30′ - 8°0′ S.; 42°0′ - 34°30′ W. 4 colors. Publicação No. 3, Serie 1, G, Inspectoria de Obras contra as Seccas, Ministerio da Viação e Obras Publicas. Oct. 1910.

[The map has an index diagram on its margin showing how it fits into the scheme of the International Map of the World. It embraces the whole of sheet B 24 and the land portion of sheets A 24 and B 25 and, as a part of the millionth map, bears the title Mossoró with the names of the adjoining sheets of which it comprises portions as subtitles. Relief is in brown shading, drainage in blue, roads in red. Ceará is reduced from the map of that state listed above.]

Brazil. [Three adjoining sheets of the topographic map of the state of São Paulo.] 1:100,000. 2 colors. Preliminary edition of 1911. Commissão Geographica e Geologica do Estado de S. Paulo. (1) Franca. 20° 30′ - 21° 0′ S.; 47°40′ - 47°10′ W. Contour interval 25 meters. (2) S. Sebastião do Paraizo. 20°30′ - 2°0′ S.; 47°10′ - 46°40′ W. Interval 25 meters. (3) Mococa. 21°0′ - 21°30′ S.; 47°10′ - 46°40′ W. Interval 25 meters.

[In execution similar to the topographic sheets of the U. S. G. S.: relief in brown contours, drainage in blue, culture in black. The eastern two-thirds of the S. Sebastião do Paraizo sheet and the northeastern corner of the Mococa sheet, which cover parts of the state of Minas Geraes, are blank.]

British Guiana. (The Daily Chronicle) Map of British Guiana. [1:1,740,000]. 8°55′ - 0°55′ N.; 62° - 56° W. 7 colors. Printed and published by the Estate of C. K. Jardine, Decd., Georgetown, Demarara, 1910. Price 24 cts.

[Shows political subdivisions, gold and diamond-bearing areas and government experimental fields for rubber and other cultivation.]

AFRICA

Africa. (a) Verbreitung und Häufigkeit des Elefanten in Afrika. Von Dr. M. C. Engell. 1:25,000,000. 38° N. - 35° S.; 30° W. - 70° E. 7 colors.

(b) Verbreitung und Häufigkeit des Löwen in Afrika. Von Dr. M. C. Engell. 1:25,000,000. Same coordinates as map (a). 5 colors.

Taf. 1 and 2, "Verbreitung und Häufigkeit des Elefanten und Löwen in Afrika" by M. C. Engell, *Ergänzungsheft zu Pet. Mitt. Nr. 171,* 1911.

[Admirable maps showing the past and present distribution and the frequency of the elephant and the lion in Africa. Map (a) distinguishes between areas in which the elephant was exterminated (1) during prehistoric times [southern Europe], (2) during antiquity [the Atlas] and (3) during the last centuries [southern Africa], and differentiates the areas of its present existence according to whether it occurs (4) rarely, (5) frequently or (6) generally. The (7) districts in which it is protected by law are also shown.

Similarly the distribution and frequency of the lion is shown on map (b). Separate symbols for regions in which the lion was exterminated (1) in historic time [Asia Minor] and (2) during the last centuries [the greater part of the Atlas, southernmost Africa and the western threshold to the Congo Basin], and for the regions in which it occurs (3) rarely, (4) frequently or (5) generally. The maps show that the whole expanse of the Sahara between the Atlas and the Sudan has never been the habitat either of the lion—contrary to popular belief—or of the elephant. The lion, furthermore, has never occupied the Congo Basin, the coast of Upper Guinea and the hinterland of the Bight of Biafra. He still occurs frequently, however, as near Europe as the Middle Atlas and sporadically in Tunisia.

Both maps are models in their treatment of a zoogeographical topic.]

Egypt. Die Neue Mariut-Eisenbahn von Alexandrien bis Marsa Matruch. Von Oberingenieur Gustav Kaiser. 1:500,000. 31°30′-30°45′ N.; 26°58′-29°56′ E. 2 colors. With inset: Profil der normalspurigen Strecke von Muassla bis Dhabba (160 km). Horizontal scale 1:300,000; vertical scale 1:3,000. Taf. 25, "Die Mariutbahn," by G. Kaiser, *Pet. Mitt.,* Vol. 58, I, Feb., 1912, pp. 115-116.

[Railroad follows along coast of Mediterranean west of Alexandria. Name derived from the delta lake in the rear of Alexandria, the ancient Mareotis.]

Morocco. [Two sheets of the map entitled] Maroc (500,000^{e}). Service Géographique de l'Armée [Paris], 1910. Price of each sheet 1 fr. (1) Flle. No. 6: Marrakech. 1:500,000. 32°23′-30°8′ N.; 11°30′-7°15′ W. Oriented N.2°E. 3 colors. (2) Flle. No. 9: Oued Noun. 1:500,000. 30°8′-27°43′ N.; 11°20′-7°13′ W. Oriented N.2°E.

[Two of the sheets of the ten-sheet general map of Morocco published by the Service Géographique de l'Armée. Relief in sketch contours in brown, drainage in blue. Index map listed in *Bull.,* Vol. 43, 1911, p. 708, under "Morocco" (first entry).]

Sahara. Part of the Libyan Desert from the route surveys of W. J. Harding King, 1909 and 1911. 1:2,000,000. 26°15′-20°30′ N.; 26°-31° E. 2 colors. With inset, 1:20,000,000, showing location of main map. Accompanies "Travels in the Libyan Desert" by W. J. Harding King, *Geogr. Journ.,* Vol. 39, No. 2, 1912, pp. 133-137.

[Valuable map embodying original surveys of a hitherto unknown region of the Libyan Desert lying west-southwest of the oasis of Kharga.]

Southern Rhodesia. Sketch Map showing the routes of Mr. R. N. Hall in the Mo-Karanga Country, June to Nov. 1908. 1:750,000. 19°25′-21°20′ S.; 30°20′-32°35′ E. 1 color. With inset, 1:22,500,000, showing location of main map. Accompanies "Journeys in the Mo-Karanga (Southern Rhodesia)," by R. N. Hall, *Geogr. Journ.,* Vol. 39, No. 2, 1912, pp. 137-139.

[Route surveys of the ill-known region to the east and to the southwest of Zimbabwe.]

Tunis. Tunisie Flle. No. XXV: Souk el Kremis. 1:50,000. 36°49′-36°36′ N.; 8°47′-9°12′ E. Oriented N.4°W. 6 colors. Service Géographique de l'Armée [Paris, 1911]. Price 1 fr. 50.

[A recent sheet of the admirable detailed topographic map of Tunis published by the Service Géographique de l'Armée. Relief in contours with shading; vegetation (four symbols) in green, vineyards in violet, towns and important roads (four symbols) in red, other roads and paths (four symbols) and railroads (two symbols)in black. As is the case with most of the maps published by the Service Géographique the map of the whole country is drawn as a unit; the central meridian, therefore, of each sheet is not oriented N.-S. Furthermore, the decimal system of angular measure is employed. For index map showing the limits of the individual sheets of this map see *Bull.*, Vol. 43, 1911, p. 547, under "Algeria-Tunis."]

ASIA

CHINA. Compass Route Traverse between Hsi-ning Fu and Kan-chou Fu, by O. R. Coales, August and September, 1910. 1:1,000,000. 39°0′ - 36°30′ N.; 100°30′ - 102°30′ E. With inset, 1:32,000,000, showing location of main map. Accompanies note, "The Road from Hsining-fu (Sining) to Kanchou-fu," *Geogr. Journ.*, Vol. 39, No. 2, 1912, pp. 155-156.

[Valuable route survey of region lying to the northeast of the Koko Nor. The route involved crossing the Nan Shan and the Richthofen Mts.]

INDIA. Railway and Canal Map of India. 1910. Scale, 1 Inch = 32 Miles, or 1:2,027,520. 40° - 5° N.; 58° - 102° E. 6 sheets. Survey of India. Price 8 rupees. Two editions: (1) "without hills." 8 colors. (2) "with hills." 9 colors.

[This and another map of India on the same scale are the largest scale general maps of India published by the Survey. Its main value lies in its large scale. In its representation of railroads and canals, which is revised annually, it is authoritative; in the present edition they have been corrected to March 31, 1910. Distinction is made between existing railroads and canals and those sanctioned and under construction; separate symbols are used for standard, medium and narrow gage railroads and for canals intended for navigation or irrigation or for both simultaneously. The remainder of the material of the map is brought down to 1904. The fact that the map is printed from old plates accounts for the unsatisfactory representation of relief on the edition "with hills." Drainage is in blue; political boundaries are indicated by color.]

INDIA-CHINA-AFGHANISTAN. [Five sheets of the map of] India and Adjacent Countries. 1:1,000,000. Survey of India. Price of each sheet 1 rupee. (1) Sheet No. 38. Punjab, North West Frontier Province, Baluchistan and Afghanistan. 36° - 32° N.; 68° - 72° E. 5 colors. Provisional Edition, 1910. (2) Sheet No. 44. Punjab and Rájputána. 32° - 28° N.; 72° - 76° E. 6 colors. Provisional Issue, 1910. (3) Sheet No. 47. Bombay and Hyderabad. 20° - 16° N.; 72° - 76° E. 5 colors. Provisional Issue, 1910. (4) Sheet 100. Parts of Tibet and China (Yün-nan and Ssu-ch'uan Provinces). 1 color. Provisional Issue, 1911. (5) Sheet 101. Part of China (Yün-nan, Ssu-ch'uan, and Kuei-chou Provinces). 2 colors. Provisional Issue, 1910.

[These sheets belong to a valuable new map of Asia south of 40° N. and included between 44° and 124° E. that is being published by the Survey of India. It is the intention to publish a preliminary edition of each sheet prior to its publication in final form. Thus, the five sheets listed above represent various stages of completeness. Sheet 100 contains drainage, roads and places only, while Sheet 101 also shows relief. The other three sheets are practically complete: Sheets 44 and 47 show relief in shading, reproduced by half-tone process, drainage in blue, roads in red. Sheet 38 shows relief in brown hachuring, roads and drainage in black. These three sheets all show political boundaries in colors. Cf. index map in the "Catalogue of Maps Published by the Survey of India," Calcutta, 1910.]

AUSTRALASIA AND OCEANIA

AUSTRALIA. Verbreitung der Speerschleuder in Australien. Entworfen von Dr. F. Graebner. 1:10,000,000. 2 colors. Taf. 22, "Australische Speerschleudern" (first part), by F. Graebner, *Pet. Mitt.*, Vol. 58, I, Feb., 1912, pp. 82-85.

[No less than 24 symbols to distinguish various types of spears.]

EUROPE

AUSTRIA-HUNGARY. Übersicht der Arbeiten an der Spezialkarte 1:75,000. [1:5,700,000.] 51°15′ - 42°0′ N.; 9°20′ - 26°50′ E. 1 color. Taf. 33, *Pet. Mitt.*, Vol. 58, I, March, 1912.

[Copy of the official index map of this standard topographic map of Austria-Hungary which is being published in a revised second edition since 1889 by the

Military Geographical Institute of Vienna. For description see *Mitt. des k. u. k. Militärgeogr. Inst.*, Vol. 27: 1907, Vienna, 1908, pp. 111-115.]

Austria-Hungary, Etc. Übersicht der Arbeiten an der Generalkarte 1:200,000. [1:10,000,000.] 53½° - 38½° N.; 6°50′ - 30°50′ E. 1 color. Taf. 34, *Pet. Mitt.*, Vol. 58, I, March, 1912.

[Copy of the official index map showing sheets published to March 1912 of the general map of Austria-Hungary and adjoining regions, sheets of which were listed in the *Bull.*, Vol. 43, 1911, p. 552. For description see *Mitt. des k. u. k. Militärgeogr. Inst.*, Vol. 27: 1907, Vienna, 1908, pp. 115-117.]

Central Europe. (a) Blatteinteilung der Übersichtskarte von Mitteleuropa 1:300,000 herausgegeben von der Kartographischen Abteilung der Königl. Preuss. Landesaufnahme. [1:6,000,000.] 60° - 46° N.; 1⅔° - 34⅓° E.

(b) Uebersichtsblatt zur topographischen Specialkarte von Mittel-Europa im Massstabe 1:200,000. [1:5,000,000.] 58⅓° - 44⅓° N.; 2⅔° W. - 29° E. Taf. 20 and Taf. 24, *Pet. Mitt.*, Vol. 58, I, Feb., 1912.

[Map (a) a copy of the official index map of a map of central Europe in five or six colors in course of publication by the Prussian Topographical Survey similar in scope to that published by the Austrian Military Geographical Institute (cf. *Bull.*, Vol. 43, 1911, p. 552, and "Austria-Hungary, etc.," above). Map (b) index map of an older general map of central Europe (the so-called Reymann'sche Karte), which is being superseded by map (a).]

Central Europe. Übersicht der Arbeiten an der neuen Übersichtskarte von Europa 1:750,000. [1:11,700,000.] 55½° - 40½° N.; 3°50′ - 35°50′ E. 1 color. Taf. 32, *Pet. Mitt.*, Vol. 58, I, March, 1912.

[Copy of the official index map showing the sheets published to March 1912 of a general map of central Europe in 40 sheets, being published by the Military Geographical Institute of Vienna. This map is published in two editions: one with altitude tints and the other with relief in shading. For a description see *Mitt. des k. u. k. Militärgeogr. Inst.*, Vol. 27:1907, Vienna, 1908, pp. 121-122.]

Denmark. Die Faeröer. Nach den Vermessungen des dänischen Generalstabes 1895-99. [1:600,000.] 62°25′ - 61°20′ N.; 7°40′ - 6°15′ W. Taf. 11, "Land und Leute der Faeröer," by C. Küchler, *Geogr. Zeitschr.*, Vol. 17, No. 11, 1911, pp. 601-618.

[Reproduced from *Atlanten*, Vol. 2, Copenhagen, 1905.]

Germany. (a) Übersichts-Blatt zu der Karte des Deutschen Reiches im Massstabe 1:100,000. Bearbeitet von der Kartogr. Abt. der Kgl. Preuss. Landesaufnahme, dem Topogr. Bureau des Kgl. Bayerischen und der Abt. für Landesaufnahme des Kgl. Sächs. Generalstabes, sowie dem Topogr. Bureau des Kgl. Württemb. Kriegsministeriums. [1:2,500,000]. 56½° - 47° N.; 4⅓° - 23⅓° E.

(b) Übersichtsblatt zur Topographischen Übersichtskarte des Deutschen Reiches in 1:200,000. Herausgegeben von der Kartographischen Abteilung der Königl. Preuss. Landesaufnahme. 1:3,500,000. 56° - 47° N.; 5⅓° - 23⅓° E. Taf. 23 and Taf. 21, respectively, *Pet. Mitt.*, Vol. 57, I, Feb., 1912.

[Map (a) a copy of the official index map of the standard topographic map of the German Empire in 674 sheets. There are three editions: two in black, one engraved on copper and the other a lithographic transfer therefrom; the third in three colors. Of this last edition about 200 sheets have been published, of the other two, all sheets. Map (b) the official index map of a map of Germany in colors based on the above standard map in 1:100,000. In Oct. 1911 166 sheets out of a total of 196 sheets had been published.]

Germany. [Fourteen sketch maps entitled]: Mittlere Jahres- und Monatstemperaturen der Schwäbisch-Bayerischen Hochebene nach der Formel ¼ (7h+2h+2×9h) [observations at 7 A. M., 2 P. M. and 9 P. M.]. [1:6,400,000.] [49° - 47½° N.; 8° - 14° E.] 1 color. (1) Jahresmittel auf das Meeresniveau red[uziert] (1851-80). (2) Jahresmittel nicht red[uziert] (1851-80). (3-14) Monatsmittel 1851-80. Taf. 2, "Die Temperaturverhältnisse der schwäbisch-bayerischen Hochebene und des Alpenvorlandes" (first part), by A. Knörzer, *Geogr. Zeitschr.*, Vol. 17, No. 3, 1911, pp. 122-134.

Germany. Karte des Pfälzerwaldes. 1:600,000. [40°39′ - 48°42′ N.; 7°10′ - 8°15′ E.] Taf. 9, "Der Pfälzerwald," by D. Häberle, *Geogr. Zeitschr.*, Vol. 17, No. 6, 1911, pp. 297-310.

[Shows limits of the continuous *buntsandstein* area, the southern (political) boundary of the Palatinate and the southern boundary of the Pfälzerwald. By the latter term it is proposed to designate that portion of the Hardt Mts. which bears the Palatinate Forest.]

GERMANY-AUSTRIA. Karte des Inn- und Salzachgletschers. 1:700,000. [48°20′ - 47°40′ N.; 11°45′ - 13°15′ E.] Accompanies, on p. 457, "A. Penck und E. Brückner—Die Alpen im Eiszeitalter" (review) by K. Keilhack, *Geogr. Zeitschr.*, Vol. 17, No. 8, 1911, pp. 451-462.

[Reproduced from the above work.]

ITALY. [Six geological sketch maps of the vicinity of Naples]: (1) Formenskizze der Roccamonfina. 1:100,000. [41°20′ N. and 14°0′ E.]. (2) Schematische Skizze zur Tektonik des Gebirgsrandes bei Nocera. 1:100,000. [40°45′ N. and 14°40′ E.]. (3) —des Gebirgsrandes bei Cancello. 1:25,000. [41°0′ N. and 14°25′ E.]. (4) —des Gebirgsrandes östlich Nola. 1:25,000. [40°55′ N. and 14°35′ E.]. (5) —des Beckens von Neapel. 1:500,000. [41°20′ - 40°30′ N.; 13°50′ - 14°45′ E.]. (6) — des Gebirgsrandes bei Maddaloni. 1:25,000. [41°3′ N. and 14°25′ E.]. Abbildungen 11, 14, 16, 15, 18, and 17, respectively, on Taf. 26 and 27, "Vulkanismus und Tektonik im Becken von Neapel" (first part) by W. Kranz, *Pet. Mitt.*, Vol. 58, I, March, 1912, pp. 131-135.

NORWAY. [Three sheets of the] Topografisk Kart over Kongeriket Norge. 1:100,000. Norges Geografiske Opmaaling [Christiania]. Price of each sheet kr. 0.60. (1) [Sheet] 20 A: Nannestad. 60°18.0′ - 59°59.5′ N.; 10°47′ - 11°36′ E. 3 colors. Edition of 1882, revised 1906. (2) 31 C: Nordre Fron. 61°48′ - 61°29′ N.; 9°1′ - 9°53′ E. 3 colors. Edit. of 1910. (3) L 11: Nordfold. 68°0′ - 67°40′ N.; 6°13′ - 5°13′ E. 4 colors. Edit. of 1911.

[Three sheets of the standard topographic map of Norway. Sheets 20 A and 31 C belong to the southern half of this map (south of 65° N.), the limits of whose sheets do not coincide with geographical co-ordinates, while sheet L 11 belongs to the northern half of this map which is subdivided into sheets by meridians and parallels. Cf. the index maps in *Geogr. Jahrbuch,* Vol. 32, 1909. Relief is mainly expressed by contours and shading in gray-green (on sheet 20 A below 200 meters by black hachuring); drainage is in blue. Sheet L 11 is an admirable representation of a glaciated district. On it glaciers are specially differentiated in green.]

TURKEY. Die Befestigung des westlichen Dardanellen-Eingangs. Nach Angaben von Generalmajor z. D. A. Janke. 1:100,000. 40°14′ - 39°58° N.; 26°10′ - 26°28′ E. 5 colors. Taf. 35, "Die Dardanellen," by A. Janke, *Pet. Mitt.,* Vol. 58, 1, March, 1912, pp. 179-181.

POLAR

SPITZBERGEN. Ice Conditions in the Spitsbergen Seas, 1911. 1:3,000,000. 79° - 74° N.; 7° - 23° E. Accompanies on p. 160 note with same title, *Geogr. Journ.,* Vol. 39, No. 2, 1912, p. 162.

[Communicated by Gunnar Isachsen, based on observations made by Capt. H. Naess of the Arctic Coal Co. Distinguishes between ice fastened to the land, unbroken and light drift ice, and scattered ice, and shows changes in edge of ice between May 23 and June 21, 1911.]

HISTORICAL

FARTHER INDIA AND MALAY ARCHIPELAGO. (a) Karte des Südostlichen Asiens nach Ptolemäus. 1:30,000,000 approx. 32° N. - 10° S.; 80° - 115° E. approx.

(b) Kartenbild des Ptolemäus mit den heutigen Namen. 1:40,000,000. Same co-ordinates as map (a).

(c) Südost Asien. 1:40,000,000. 35° N. - 10° S.; 85° - 121° E.

Accompany, as Taf. 1, "Südost-Asien bei Ptolemäus," by W. Volz, *Geogr. Zeitsch.,* Vol. 17, No. 1, 1911, pp. 31-44.

[Map (a) Ptolemy's map with the nomenclature of the *Geographike Hyphegesis;* map (b) the same map on a smaller scale with present nomenclature where features possible of identification; map (c) a modern map showing the features under consideration.]

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PROGRESS OF ALASKAN TOPOGRAPHIC SURVEYS (BY THE UNITED STATES GEOLOGICAL SURVEY)

BY

R. H. SARGENT*

(Two maps opposite p. 560.)

The first rumor of land to the east of Siberia reached St. Petersburg during the early part of the eighteenth Century. Peter the Great, then Czar of Russia, realized at once the importance of such a discovery and in 1728 sent out an expedition under Vitus Bering to verify this rumor. Sailing along the east coast of Siberia to East Cape,† Bering steered to the northeast for one day, when, without sighting land, he returned to port.

Subsequent trips were made by Russian explorers, but it was not until 1741 that Bering, while on another trip, discovered Alaska, first sighting Mount St. Elias, now a cornerstone on the eastern boundary of the Territory. The report of valuable furs in the islands to the east of Kamchatka which was brought by Bering's crew led many Siberian fur hunters to these islands and the adjacent mainland. It was through the daring fur traders that the world first learned of the Aleutian Islands.

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† In 1898, by command of the Emperor of Russia, the name of East Cape, the most eastern point of Asia (Siberia), was changed to Cape Deshnef in honor of the explorer who discovered it. The new name has now appeared for years on all or nearly all of the maps published in continental Europe, on many maps printed in the United Kingdom and in authoritative gazetteers and encyclopedias. The latest edition of the *Encyclopædia Britannica* has Cape Dezhnev (East Cape) on its map of Asia but East Cape in its text. Many geographical societies are using the new name and this seems certain to become the common usage.—EDITOR.

Practically nothing was accomplished in obtaining geographical data until 1778, when Captain Cook, the noted English explorer, sailed along the west coast of North America in search of the much-debated Northwest Passage. He was not successful in discovering a passage to Hudson Bay, but in a single summer he obtained much more valuable data than all previous explorers. He made the first systematic surveys of any part of what is now Alaska. He outlined the larger coastal features from 58° to 70° N. L., and his maps were for many years the only ones of much of this coast.

In 1793-94 George Vancouver, also an English explorer, charted the coast between 35° and 60° N. L., and in the two seasons executed a survey of thousands of miles of shore line. Considering that the narrow and intricate waterways of the Alexander Archipelago were traversed with sailing vessels and row boats and that the instruments and methods employed were inferior to those in present use, Vancouver's surveys in extent and accuracy are little less than marvelous.

Exploring and charting the coast line were gradually continued by Spanish, English, and Russian Naval officers, members of the Russian-American Fur Company, and others, until in 1837 the entire coast had been mapped in a general way. Explorations were made of the lower parts of the Yukon, the Kuskokwim, and the Susitna rivers by the Russian Company in extending its fur trade.

The first white men to travel entirely across Alaska were members of a Western Union Telegraph Expedition who, in 1867, made a traverse of the Yukon River from Nulato to Fort Yukon. They thus established the identity of the Yukon of the Hudson Bay Company in the east with the Kwikpak of the Russians in the west.

At the time Alaska was purchased from Russia the entire coast line had been mapped with varying degrees of accuracy. The lower reaches of the Yukon, the Kuskokwin, and the Susitna rivers had been explored and sketched, and a foot-traverse made of the Yukon from Nulato to Fort Yukon. Of the remainder of the interior little was known and the general impression prevailed that the Territory was a land of ice and snow. This is not surprising, since nearly the entire coast from Cross Sound to Cook Inlet is flanked by a bulwark of high and rugged mountains covered deeply by snow in winter which remains until late into the summer and in many instances throughout the year.

The first official map of Alaska by the United States Government was compiled for the State Department by the Coast and Geodetic Survey in 1867, and shows our great lack of knowledge of the interior at that time. Soon after the transfer of the Territory systematic surveys of the coast were inaugurated by the Coast and Geodetic Survey, on which it has been actively engaged ever since. During the eighties a few expeditions in charge of officers of the Army, Navy, Revenue Cutter Service, and others were made along the principal rivers. Among these officers were Lieut. Schwatka and Lieut. Allen of the Army, Lieut. Stoney of the Navy, and Lieut. Cantwell of the Revenue Cutter Service. In 1883, Schwatka made a complete traverse of the Yukon, which for years remained the only authentic data of the entire river. Lieut. Allen's expedition was the most remarkable one in the history of the Territory. Landing at the mouth of the Copper River, he proceeded up the Copper, across to the Tanana, and down this stream to the Yukon, then across to the Koyukuk, which he explored from the Arctic Circle to the Yukon. Crossing from the lower Yukon to Norton Sound, he reached St. Michael after a journey of over one thousand miles. In the north, Stoney and Cantwell explored the Kobuk River, and a member of Stoney's party crossed to the Colville, thence to the Chipp, which he followed to the Arctic Ocean, being the first white man to cross northern Alaska. While some of these expeditions were remarkable feats of daring and hardships, geographically the results were limited, since they were surveys of but very narrow belts along the rivers.

While a somewhat more exact geographic knowledge of the Territory gradually developed through the information received from the hardy prospectors and fur traders as well as from official sources, it was not until 1895, nearly thirty years after its purchase, that Congress awoke to the importance of more systematic surveys of the interior and the investigation of Alaska's mineral wealth. The investigation of the mineral resources of the Territory has been intrusted to the United States Geological Survey. The investigation of the mineral resources demand that geological surveys be made and the successful correlation and study of the data acquired necessitate the construction of base maps of the areas covered by the investigations.

The work of the United States Geological Survey in Alaska from the accession of the Territory up to and including 1904 has been described by Alfred H. Brooks in an article* published in the *Bulletin* of the American Geographical Society.

The maps of Alaska published by the United States Geological Survey are divided for convenience of designation into three general types: exploratory maps (1:625,000, or nearly ten miles to an inch, contour interval 200 feet); reconnaissance (1:250,000, or about 4 miles to an inch, contour interval 200 feet); detailed maps (1:62,500, or a little less than one mile to an inch, contour interval 25, 50, or 100 feet according to the relief). The scale of publication is governed by the accuracy and the amount of detail with which the field work is executed. In exploratory surveys, modes of travel and methods of survey are adopted which permit of the maximum speed, since the object is to procure as much geographical data as possible, and exact geodetic position is subordinated to the collection of these data. Such surveys are usually route traverses in which directions are generally obtained by use of the magnetic needle and in most instances distances are measured by stadia or micrometer measurements. Sometimes, where the transportation is by canoe the speed of the boat down stream is estimated or the distance is paced along the bank of the river. In most cases plane tables are used upon which the traverse is platted in the field and the adjacent topography delineated. Frequent astronomical observations for latitudes and azimuth are made by means of which the geodetic position of the surveys is determined.

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* The Investigation of Alaska's Mineral Wealth: Vol. XXXVII, No. 1, Jan. 1905, pp. 26–40.

Reconnaissance maps are executed in greater detail than exploratory maps and are results of areal rather than route surveys. Regular plane table methods are employed, supplemented by locating control points by the more exact method of instrumental triangulation. In many instances observations for latitude and azimuth are made by the topographer who is doing the mapping. In such cases the longitudes of the surveys are obtained by connections with previously located areas. These connections are often unsatisfactory, but it is considered that the accuracy is much greater than it would be possible to obtain by time observations and comparisons under the existing conditions. Along the southern coast the geodetic control of the Coast and Geodetic Survey is so well extended that many of the surveys have been connected directly with it.

Detailed maps of certain small areas of special economic importance are made on a larger scale and in greater detail and accuracy than is furnished by the reconnaissance maps. These surveys are executed by the same methods and with the same accuracy as similar surveys in the states and have proved of the utmost value in mining and water power developments. While these detailed surveys in themselves are accurate, the geodetic position as in the case of the reconnaissance surveys is often dependent upon astronomic determinations made by the topographer.

The first work of the Geological Survey was mainly of an exploratory nature along the principal rivers. By 1900, exploratory surveys had been executed of most of the principal waterways, thus forming a net work of partially connected surveys, while the intervening areas were large and practically unexplored.

The successive discoveries of rich gold placers in the Klondike in 1896, at Nome in 1898, and at Fairbanks in 1902, attracted thousands of gold seekers to the Territory and created a demand for more exact topographic information. Consequently, purely exploratory or route surveys gave way to reconnaissance or areal surveys. By 1906, practically the entire Seward Peninsula had been mapped, much of the Yukon-Tanana region, and a large area in the Copper River region. Previous to 1905, detailed surveys were inaugurated by mapping an area about Juneau, which is the largest lode gold producing district in the Territory. Demands for similar surveys in the Seward Peninsula were met by mapping an area of 490 square miles extending from Nome northward and another of 440 square miles from Solomon northward, covering the most important placer gold districts of the Peninsula.

The appropriation for the investigation of Alaska's mineral wealth, which was but $25,000 in 1899, was gradually increased to $90,000 in 1909, and $100,000 in 1910, thus making it possible to keep the work more nearly abreast of the mining developments; and the topographic mapping has progressed hand in hand with the geologic investigations. A few exploratory expeditions have been made, but in the main the work has been on the reconnaissance scale.

The Yukon gold fields were the first region where areal mapping was executed. As early as 1898 the Fortymile district was surveyed on the regular reconnaissance scale. The placer gold production of this region gradually increased from barely a thousand dollars in 1884 to over $10,000,000 in 1906, thus creating a demand for added surveys. While work in this region was not continued without interruption, it kept pace with mining development and, by the end of 1910, maps had been made of the entire area lying between the Yukon River on the north, the Alaska Range on the south, the 141st meridian on the east, and the Nenana and the Tanana rivers on the west, with the exception of a few thousand square miles west of the eastern boundary and south of the Tanana River. The area surveyed includes approximately 35,000 square miles, the largest area of contiguous surveys in the Territory. In 1907 a detailed topographic map was made of the Fairbanks district, within the Yukon-

Tanana region, with a view of making a thorough geologic study of the placer deposits and collecting information concerning the occurrence and distribution of placer gold. The area covers 450 square miles and is the richest gold placer district thus far discovered in the Territory.

All surveys in Alaska are of necessity expensive, because of the remoteness of the areas mapped and the shortness of the field season, and in the Yukon-Tanana region the expenses reach the maximum. The field season, which extends from about June 15 to approximately September 15, is governed by the time the Yukon River, which is the regular route, is open to navigation, and by the grass supply where pack horses are used. Fortunately, the dates of Yukon transportation and of available forage very nearly coincide. The average output of one topographic party during a season is approximately 3,000 square miles and the cost per square mile in this region averages about $2.50.

Reconnaisance surveys were commenced in the Copper River region in 1900 and in two years an area of 16,000 square miles was mapped. These earlier surveys, both topographic and geologic, have been of great value to the mining interests. In this particular region the maps of the Geological Survey proved most important as a basis upon which the study of available railroad routes was made by means of which the route followed by the present railroad up the Copper River Valley was selected.

In 1910 the Valdez Creek district was mapped on the reconnaissance scale by two topographic parties, resulting in the survey of an area of nearly 5,000 square miles. This district lies just south of the Alaska Range in approximately longitude 147° W. Valdez Creek, on which is the greatest amount of mining development, is a tributary of the Susitna River, near its head. As a producer of placer gold, attention was first drawn to this creek in 1903, but since other regions of apparently greater importance demanded the immediate attention of the Survey, this district was not surveyed until 1910. The maps of this area add much to the knowledge of the topography of the Alaska Range between longitudes 146° and 148°, and of the headwater region of the Susitna and the Gulkana rivers. Mount Hayes, the highest point in this region, was definitely located and its elevation found to be 13,940 feet. The maps show large glaciers, some of them over twenty miles long, which fill the valleys in the vicinity of Mount Hayes. The survey of the Valdez Creek district was of peculiar interest, because of its remoteness from steam transportation. The supplies for the parties were sent to the locality by sled the previous winter at a cost of $700 per ton, and the members of the parties walked 190 miles before commencing work and 270 miles back to the steamer after having completed the season's work.

The area surveyed in the Valdez Creek region is contiguous to the previously mapped areas of the Copper River Basin to the southeast, and of the Yukon-Tanana region to the north, thus forming a belt of mapped area extending from the coast to the Yukon River.

The rapid industrial advances in the Copper River region have made detailed surveys imperative. The Nizina district, containing rich copper deposits of vast extent to which a very expensive railroad has been built, was naturally chosen as the logical area in which to study the copper deposits with a view to determining if possible the laws governing their occurrence. Accordingly, during the summer of 1908, a detailed topographic map covering an area of 325 square miles was made.

The Kuskokwim River was explored and mapped in 1898 by one of the first parties from the Geological Survey. But not until 1910 were further surveys executed in this part of Alaska. During that year a reconnaissance survey was made of the Innoko region, which lies south and east of the Yukon River in longitude about 156° W. and at the headwaters of Yukon and Kuskokwim drainage. This survey, which covered a region of approximately 3,200 square miles, furnished definite knowledge of an area much of which was almost unknown. While no features of remarkable interest were noted in this area, the headwaters and in some instances the entire courses of streams were definitely located. In addition to this areal mapping, a traverse was made of the Iditarod River from Iditarod City to its confluence with the Innoko River and down that stream to its mouth at Holy Cross on the Yukon. These rivers flow, for the most part, through a featureless plain nearly reduced to base level, and their sinuosity is very great. The traverses represent the courses of the streams at a minimum stage when they are confined within very low banks. During the spring high water, the rivers overflow their banks, flooding the plain for miles on either side and steamboats literally sail across country.

The Susitna valley on the west and the Matanuska valley on the east of the Talkeetna mountains, which lie just north of Cook Inlet, were regions of exploratory surveys during the early period of survey work in Alaska. Subsequent discoveries of valuable coal deposits in the Matanuska Valley drew attention to this region, and in 1906 reconnaissance surveys were made of the Matanuska valley and of as much of the Talkeetna Mountains as was possible during the season. There still remains an unmapped and practically unknown area in the heart of the mountains. The area covered by the survey was about 7,200 square miles.

The coal fields in the Matanuska valley continued to attract attention and received cursory examination and during 1910 a detailed study of the larger part of this field was made. To facilitate the work of correlating the geologic data a detailed topographic map covering an area of 196 square miles was made the previous year.

The only survey which has been executed on the west side of Cook Inlet was made of the region about Lake Iliamna, the largest lake in the Territory. This reconnaissance survey, which commenced on Iliamna Bay on the west coast of Cook Inlet, extended across the rugged mountain range between the Inlet and the Iliamna Lake basin and also covered a large area about Lake Clark. In addition to mapping a large area of the adjacent country, the work yielded the first instrumental survey of Iliamna Lake, which is about 75 miles long and averages 15 miles wide, and Lake Clark which is 50 miles long and averages 3 miles wide. These lakes are less than 100 feet above sea level.

In addition to the reconnaissance surveys which have been mentioned a few additional areas have been mapped by geologists and others incidental to various investigations. Among these surveys was that of an area on the eastern side of the Alaska Range in the vicinity of Mount McKinley. While this map does not cover in detail the area in the immediate vicinity of the mountain, it shows the salient features and covers an area of economic interest and value from a mining standpoint. Earlier maps had been made of the west slope of the range with which the later maps combined to give much knowledge in the vicinity of the highest point on the North American continent.

In 1910 a geologic reconnaissance of the now famous Controller Bay district was made and in 1905 a detailed topographic survey was begun and completed in 1906. Although this map offered little of geographic importance, it has been of much value to the mining interests. The information given by these topographic and geologic surveys has been the basis of the active interest and development in the Controller Bay Coal Field.

In southeastern Alaska detailed surveys have been made of the Juneau gold belt, which extends from Douglas Island northward to and including the Berners Bay district. These surveys cover the areas included within the Juneau district, Eagle River district, and Berners Bay district.

Surveys in Southeastern Alaska have been executed under extreme difficulties. Practically the entire region below an elevation of 2,500 feet is covered by a dense blanket of spruce, cedar, hemlock, brush, and other vegetation, of which the Devil's Club is the most annoying. The luxuriant vegetation and the fallen timber make these forests almost as impenetrable as a tropical jungle. These obstructions to travel and the almost continual rains make surveying in this region very difficult and expensive. The cost per square mile averages about $42.

Other areas in Southeastern Alaska in which mining developments have been sufficient to warrant detailed mapping are the copper districts on Prince of Wales Island. Detailed maps have been made of the Kasaan Peninsula district on the east side of the Island and the Copper Mountain district on the west coast.

In the foregoing an attempt has been made to indicate the geographic and topographic data acquired by the Geological Survey up to 1911. It may be of interest to outline in detail the work of one season, and, accordingly, the expeditions which were made during the past summer are described separately. The work of 1911 varied widely in locality and in scale. For the first time in several years there was an important exploratory expedition, during which a continuous topographic survey was executed. The party, consisting of P. S. Smith, geologist in charge, and C. E. Giffin, topographer, a station assistant, two boatmen, and a cook, proceeded by steamer up the Koyukuk River to the mouth of the Alatna River. Here they loaded their outfit and supplies into three Peterborough canoes and commenced their long journey to the headwaters of the Alatna. At Help-me-jack Creek, a tributary from the west, the topographic surveys of the season were commenced. They were a continuation of similar surveys which had been made in 1901 up the Alatna to this point, thence up the Help-me-jack and down the Kobuk to Kotzebue Sound. At the headwaters of the Alatna the Smith party found a pass 1,000 feet high leading to the headwaters of the Noatak River. Across this pass the supplies, equipment, and boats were portaged for twelve miles by the members of the party. This portage was a difficult task, since the supplies and camp equipment, exclusive of the boats, weighed 1,800 pounds and necessitated five trips for the members of the party. Four and one-half days were consumed in packing the supplies over this pass. Once on the Noatak, the party drifted to its mouth at Kotzebue Sound. Throughout this distance of 650 miles a topographic survey was executed of a heretofore little known and entirely unmapped country covering an area of over 10,000 square miles.

A topographic party in charge of D. C. Witherspoon mapped an area of 1,900 square miles in the Hanagita Valley and Bremner River region. While this area was more accessible than the Noatak region, it was as little known, and the map resulted in authentic information concerning the course of the Bremner River and its tributaries.

Mr. Witherspoon's party consisted of himself, a station assistant, two packers, and a cook. Transportation was by a pack train of eight horses. Since in the region traversed there was no possibility of procuring supplies, rations for the entire season were carried, which necessitated many double trips during the earlier part of the season. Before visiting the Hanagita Valley country the same party made surveys along the face of the mountains from Cordova eastward to the Copper River, and the last month of the season was spent in extending a system of triangulation from an astronomic station at Copper Center southward to connect with a station in the Hanagita Valley country.

Another topographic party, consisting of five men and seven horses, of which the writer was in charge, landed at Homer, a small town on Kachemak Bay on the east side of Cook Inlet. Traveling also by pack train, their course lay eastward along the north shore of the bay and for 35 miles up the valley of Fox River, a stream entering the head of the bay from the east. From this point, which was near the western face of the main range, they turned to the north and followed the foot hills along the front of the range to Turnagain Arm. Topographic maps were made of an area covering about 3,760 square miles. These surveys practically complete the mapping of Kenai Peninsula. Up to last summer much of the topography of the interior of Kenai Peninsula south of Kenai Lake has been unknown and the hypothetical sketches of the area have been very erroneous. In the course of the surveys of this expedition it was proved conclusively that this great area of unknown country was covered by an immense ice cap, the tongues of which shoot out of every valley which connects with the main reservoir. This field is a wonderful sea of ice 70 miles long and twenty miles wide. Its surface, which is a dome, is here and there broken by the crests of mountain islands some of which are over 6,000 feet above sea level. Many of the glaciers, of which there are thirty-six, extend down the valleys for more than ten miles. The crest of this immense reservoir of ice is over 4,500 feet above sea level, while some of the glaciers on the east and south coasts extend entirely to tide water. If the elevations of the valley floors which are covered by this field of ice can be judged by those of similar valleys in the northern part of the Peninsula, its thickness must be between 2,000 and 3,000 feet.

The addition of these new geographic data add much to the map of Alaska. A report on the glaciers of Prince William Sound and the Kenai Peninsula by U. S. Grant and D. F. Higgins based on surveys made in 1909 is now in course of publication.

Until within the past two years the interest of the Alaskan prospector centered chiefly in the search for placer gold, but during the past few months much interest has been manifested in search for lode deposits, with the result that a few valuable auriferous quartz veins have been located. The country about Valdez has proved an important field of search, and, accordingly, an area of 160 square miles was mapped on the scale of 1 : 62,500 by J. W. Bagley during the past season. The most interesting feature in this piece of work is the method by which the work was executed. The plane table was supplemented by the use of a panoramic camera. Although the photo-topographic method has been widely used, this is probably the first extensive application of a panoramic camera for this purpose. Mr. Bagley also constructed by the same method a similar map of a small area in the Moose Pass district on the Kenai Peninsula where extensive lode deposits have been located and a few hundred square miles of country in the northeastern part of the Peninsula on the reconnaissance scale.

A summary of the work of the Geological Survey to date shows the following:

	SCALE.	SQUARE MILES.	PERCENTAGE OF TOTAL AREA OF ALASKA.
Exploratory surveys	(1:625,000)	47,680	8.16
Reconnaissance surveys	(1:250,000)	114,045	19.45
Detailed surveys	(1:62,500)	3,022	.52*

During the fourteen years in which the surveys in the interior of Alaska have been executed under the Geological Survey, the geographic knowledge of the Territory has steadily increased, and although there are many large areas which have not been surveyed, the salient features have been mapped and much data are available concerning areas which have not been visited by members of the Survey.

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* In addition to the above the International Boundary Survey and the Coast and Geodetic Survey have made surveys of parts of Alaska and the General Land Office has executed subdivisional surveys in four localities within the Territory.

The reconnaissance maps, which now cover an area of approximately 114,000 square miles, or nearly one-fifth of the Territory, are eagerly sought by prospectors and have proved most valuable to them. The detailed surveys have been executed with care and precision and have been of valuable assistance to mine operators and to engineers as a basis for engineering work. The Alaskan topographic maps are usually first used as illustrations accompanying the geologic reports which are for free distribution. Sale editions of the detailed maps are made as soon as the reports in which they are first published are exhausted. The usual price is five or ten cents to cover cost of publication.

With a view to completing eventually a series of maps on the scale of 1:250,000 covering the entire Territory, a plan has been inaugurated for issuing the maps in sheets covering quadrangles of the earth's surface two degrees north and south and four degrees east and west. These maps, which are 32 by 36 inches, covering an area of approximately 16,400 square miles, are sold for twenty-five cents. Five of these maps have already been published.

The general policy of the Survey in Alaska is to keep pace with the demands for authentic information so far as the appropriations will allow. This demand is met not only by publication of new maps but also by occasional revised editions of maps previously printed.

With improved transportation facilities and better organization of the work, the results are each year becoming more satisfactory. The demand for maps and other publications of the Survey and the hearty cooperation of prospectors, mine operators, business men, and corporations are an evidence of the popularity and value of the work of the Survey in Alaska.

A GEOGRAPHIC STUDY OF DULUTH*

BY

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The Harbor and Water Transportation. The Duluth harbor (Fig. 16), as stated above, is formed by the union of the tapering southwestern extremities of Lake Superior with the mouth of the St. Louis River. Two long sand spits have formed across the bay, one extending for a distance of seven miles from the Minnesota shore at right angles to Duluth and the other a distance of three miles from the Wisconsin shore parallel to Superior. The natural entrance to the Duluth-Superior harbor, therefore, is located seven miles from Duluth. The pioneers of this vicinity were not slow to observe the disadvantage of that distance and to see the possibility of making a gateway immediately in front of Duluth. Little time was lost in proceeding with the construction of a ship canal across the spit (Fig. 16), which at once stimulated activities in Duluth.

Navigation between the Lake Superior and the lower lake ports during the season of 1910 covered a period of 245 days, but "the open season for Duluth-Superior harbor, to and from Lake Superior ports only, was much longer, as navigation was closed to the local boats only a few weeks during the year."†

The long sand spit, Minnesota Point, now a sand bar since the building of the ship canal, is one of the primary causes for Duluth's almost unexcelled harbor. It is perfect protection against storm waves, and therefore makes the handling of the commerce in the harbor absolutely easy. Because of the excellence of this harbor and that of other harbors on the great lakes with which commerce is carried on, the boats carrying cargoes of coal, iron ore and wheat have been enlarged, until to-day 500-foot freighters drawing eighteen to twenty feet are common and boats over 600 feet in length not unusual. While the harbor is dredged to a depth of twenty-two to twenty-six feet, if necessary it could be dredged to a depth per-

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*Concluded from *Bulletin*, June, 1912, pp. 401–417.

† "Marine Commerce, Duluth-Superior, 1910." G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.

mitting it to accommodate the world's largest boats, which draw 30 to 36 feet of water. These boats that approach close to a thousand feet in length could turn around easily in the spacious harbor; they could also anchor without difficulty, as the sandy bottom facilitates firm anchorage.

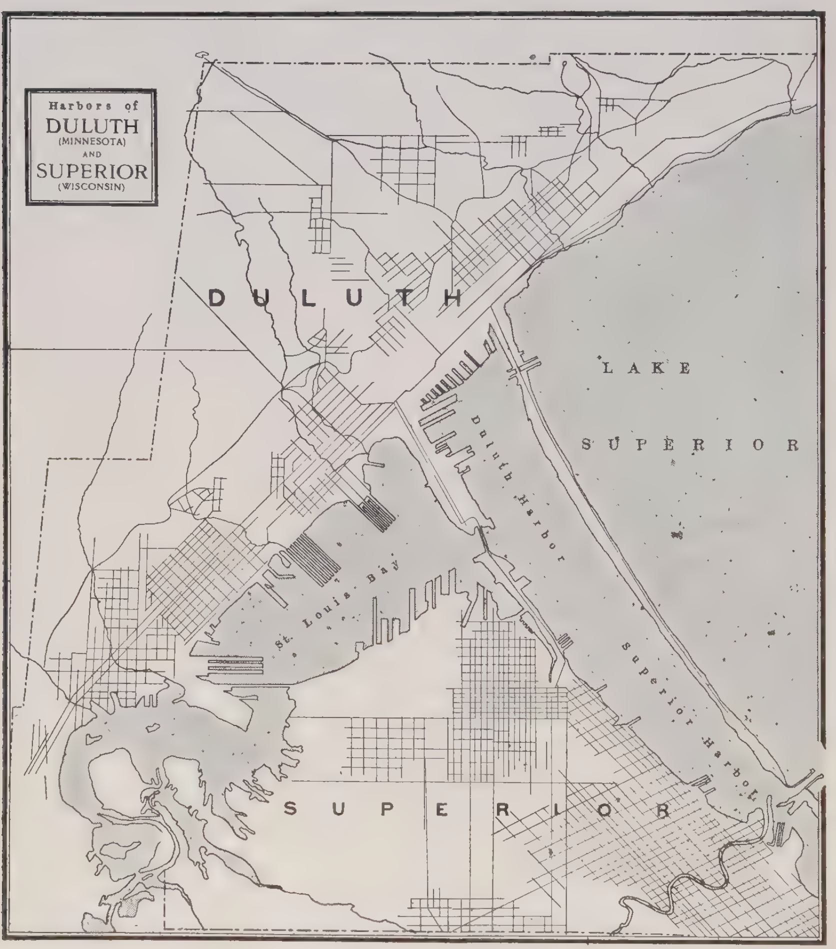

FIG. 16.

The ideal conditions for the best harbor may be stated to be: Easy approach; protection from heavy waves; deep channel; spaciousness; bottom for firm anchorage; a minimum of silting; absence of strong currents; easy communication with the hinterland. Every one of these conditions may be found in Duluth harbor, with the possible exception of the last one, which, however, is true in a modified form. The approach from the east, south and southwest is easy, but from the west, northwest and north somewhat more difficult because of the presence of the range referred to above under Topography. This obstacle, however, is fast being overcome by tunneling and grading, so that it will soon be a negligible quantity.

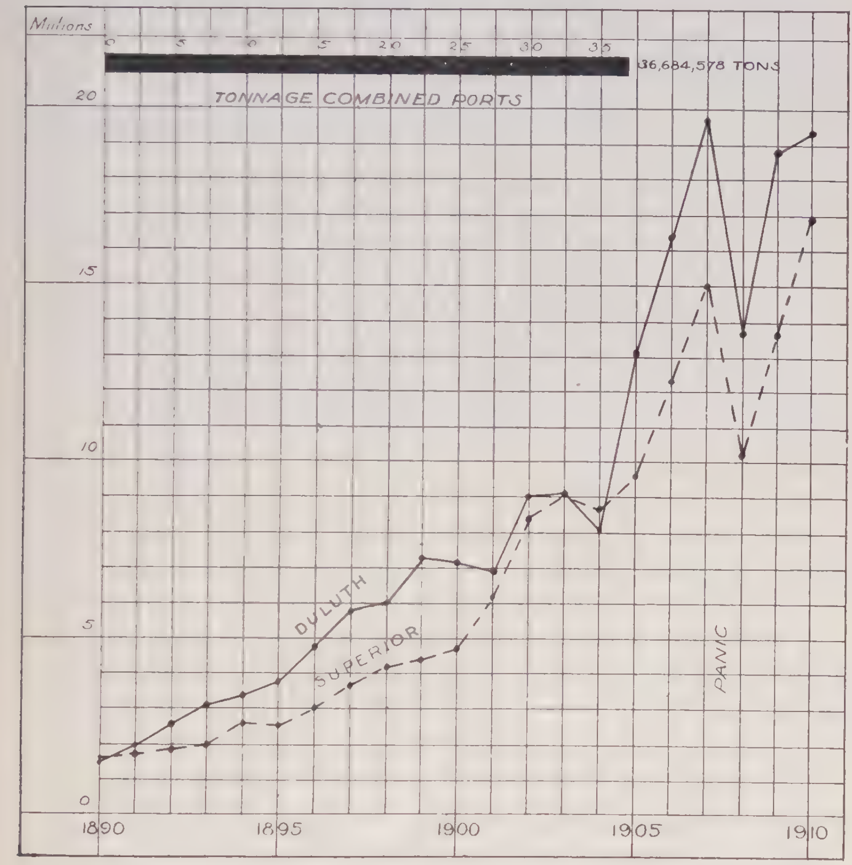

FIG. 17—Vessel freight received and shipped, Duluth and Superior.

The spaciousness of the harbor, combined with the jutting peninsulas that afford a long shore line and therefore large dockage possibilities, is of consequence. The length of docks influences the length of boats which will put into a harbor, and also influences very materially the cost of unloading and loading a boat. Duluth's harbor, as well as that of Superior, permits of the construction of docks of greatest length necessary, as well as of the kind necessary to accommodate any sort of boats at a minimum cost.

"Combining Duluth and Superior, the area accessible to railroads now existing as wharfage is 664 acres, and area available is 4,069 acres. The net total number of acres, including the present wharf and possible wharves, allowing for certain space necessary for slips, is 4,733 acres. The entire harbor space, including Minnesota Point and Big Island, which are now inaccessible to railroads, includes eleven square miles, or 7,040 acres. At present, but one-seventh of the available space is occupied by wharves in operation and under construction. The lineal quayage, excepting the distances measured along slips, is forty-nine miles."*

These figures show impressively the tremendous capacity of the harbor, and the almost unlimited space for the expansion of commerce. A comparison of this harbor with a few of the world's great harbors is striking.

At Liverpool and Birkenhead, England, the basin occupies 583 acres and a lineal quayage of thirty-six miles, 255 yards. At Rotterdam, Holland, the harbor covers an area of 460 acres and has twenty-three miles of quayage. Hamburg, Germany, has a total water area of 1,282 acres and a lineal quayage of over fifteen miles. It has "in addition twenty-one miles of riverside and canal accommodations for river craft."†

Such unusual facilities have resulted in the development of water traffic, as shown in Fig. 17. Excepting in 1904, the total vessel freight received and shipped at Duluth has exceeded that of Superior. The total tonnage for both ports in 1910 was 36,684,578 short tons. In general, the commerce has been upon a very rapid increase, except for the notable year of 1908, when the financial panic bore its influence. The striking recovery immediately after the panic is partly a result of the nature of the products making up the commerce of the harbor, and partly due to excellent storage and dockage facilities of the harbor.

The Sault Ste. Marie Canal, at the eastern extremity of Lake Superior, has the largest tonnage among all the world's canals. Fig. 18 shows what that tonnage has been for the years 1901 to 1910 inclusive, having reached nearly 50,000,000 in 1910. This is the vessel tonnage which, of course, includes a large variety of commodities. The freight tonnage of Duluth during the past five years has averaged about 38 per cent. of the total vessel tonnage passing through Sault Ste. Marie. The net iron ore tonnage for Duluth for the same period has averaged about 75 per cent. of Duluth's total freight tonnage. Comparing the fluctuations in the total output of iron ore with variations in Duluth's total net freight tonnage, and with the vessel freight tonnage of Sault Ste. Marie, the very close relation of the tonnage through the canal and the commerce of Duluth's harbor is readily seen. This is one of many illustrations which may be cited to demonstrate the fact that the Duluth harbor influences the tonnage in the great lakes region more than any other harbor. In fact, no other harbor on the lakes has a tonnage equal to that of Duluth, nor has equal facilities for handling a tonnage as large.

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* For Duluth the area of existing wharves accessible to railroads is 305 acres and the area available for additional wharves is 1,790 acres. "Report upon the Improvement of Rivers and Harbors in the Duluth, Minn., District." G. D. Fitch, Lieut.-Col. in charge.

† J. Paul Goode, "Development of Commercial Ports." Report of Chicago Harbor Commission, 1908.

It is impractical to compare the tonnage of the Duluth harbor directly with that of ocean ports, because record of domestic tonnage is not kept at the custom houses, and hence a comparison of the records of the custom houses on the lakes and on the ocean would be faulty. However, comparing the average monthly tonnage movement for the eight months' season of navigation of the Duluth-Superior harbor with the average for other American ports, Duluth ranks probably next to New York.*

Local Geographic Conditions

Handicaps. If two places offer practically equivalent opportunities, and it is left for a group of people to choose between them, that place which makes the stronger appeal, either esthetically or materially, will be chosen. Duluth certainly might have appealed to the esthetic sense years ago, when Superior was first founded, just as it does to-day. But Superior was a progressive town years before Duluth started. It is true that the slope of the range offers magnificent sites for residences. The view over the harbor is inspiring, and undoubtedly when the forests still occupied much of the surface was much more so than to-day. The question, then, as to why Duluth, with a later start than Superior, should have grown to a city nearly twice its size cannot be answered directly on the basis of a more beautiful location for homes. The site of Duluth is by no means as practical for a city as that of Superior, because building is difficult and expensive, due to the haul of materials up steep grades; because foundations for the most part must be blasted in rock; because street cars consume a very much greater amount of electric power climbing hills than when running on level ground; and because the wear and tear on them, as well as on all vehicles, is at a maximum. The cost of distribution of commodities is necessarily high because of the hills to climb. Loads must be light and hence small.

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* Marine Commerce, Duluth-Superior, 1910. G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.

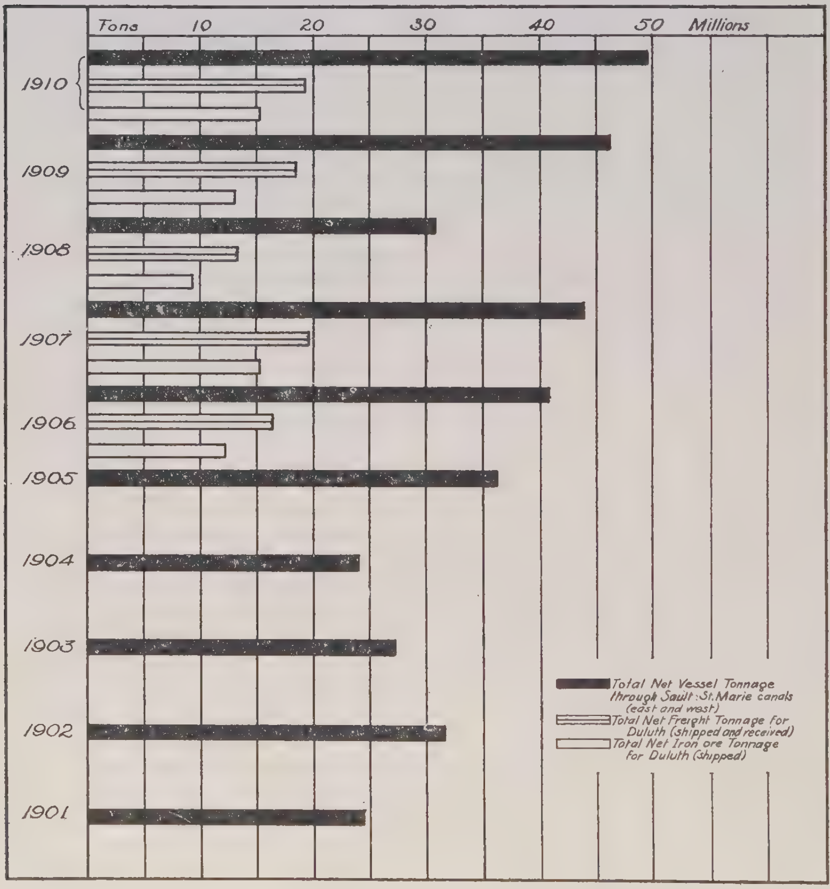

FIG. 18—Tonnage through Sault Ste. Marie Canals.
References: U. S. Statistical Abstract, 1910; Marine Commerce, Duluth, Superior; U. S. Eng. Office, 1906–1910.

The approach to Duluth by railroads from westerly and northwesterly directions is difficult. The area available for terminal yards is all too small; in fact, it will not accommodate present needs, and will undoubtedly remain a handicap until some double-decked or triple-decked system of railroad terminals is adopted.

Advantages. Then why, with all the above apparent disadvantages, should Duluth have become the city that it is to-day, with 78,466 people, but with activities representing in general a city of 150,000, and in specific instances a city of 1,000,000?

Why is not the iron ore carried to the Superior side, where the land is flat? Because it is located at Duluth's back door; Duluth is located at the nearest, best accessible point to the lake. Because it is much easier and far less expensive to bring the boats seven miles nearer Duluth, and to let them carry the load back over those seven miles again and on to Sault Ste. Marie and the lower lakes, than to let the railroads carry the ore seven miles across bridges and viaducts to Superior. If it were cheaper to carry the ore to the flat land across the bay, where railroad terminal facilities are much better in many respects, the ore would be carried there. If a method should be found whereby it will be cheaper to take the ore across the bay and load it on boats there, that will be done. Large quantities of ore are shipped to Superior docks now as the result of improved railroad facilities and competition among railroads. However, up to the present time the difference in distance has been a most potent factor in determining Duluth's supremacy over Superior as an iron ore shipping point.

A secondary observation is worth noting, namely, that the ore boats on their return from the lower lakes bring coal. This coal they may dock at the nearest docking point, which is Superior. Hence, they may enter the natural channel at Superior, unload their coal, cross the bay to the ore docks, load the ore and leave via the ship canal to return to the East.

Inasmuch as the ore business is most advantageously conducted from the Duluth shore, those controlling the business will certainly choose the more beautiful site for their residences; hence, Duluth becomes their home. Laboring men employed on the ore docks locate their residences near their work. The needs of these men, such as food, clothing, etc., must be supplied; therefore, stores of various kinds are established. Secondary industries arise. These, combined with incidental factors that center about and grow out, directly and indirectly, from a localized industry of tremendous proportions, develop a large community—another reason for the existence of Duluth.

A second important influencing factor in Duluth's situation may be advanced at least as theory, if not fact. Throughout the history of the world the boats of all explorers have penetrated inland as far as the waters ahead would carry them. Merchants on the seas have always traded with points as far inland as their boats would take them. Almost without exception, the farthest easily accessible inland point has become the terminus of water transportation, with the other points en route as way-stations. In the United States a few examples may be cited: Providence, R. I., at the head of Narragansett Bay; Philadelphia, Pa., on the Delaware River, well above the head of the bay; Baltimore, Md., close to the head of Chesapeake Bay; Mobile, Ala., at the head of Mobile Bay; and New Orleans, La., at the head of tide-water 100 miles up the Mississippi River.

In Canada, Quebec had been for centuries the head of navigation on the St. Lawrence River; but recently the improvements in the river, making it possible for ocean boats to reach Montreal, farther up the river, made it the head of navigation and Quebec a way-station. Manchester, England, located 36 miles from the head of the estuary of the Mersey River, has been an inland city, with Liverpool as the seaport. Manchester constructed a canal, so that boats may now pass Liverpool, go up the canal and trade directly with Manchester. A complete change has not come as yet, but Liverpool's commerce has been affected; its rates on commodities have been lowered. It is very probable that so far as freight is concerned Manchester may be the head of navigation just as soon as the prestige and tradition of Liverpool's centuries of trade are broken.

So in the case of Duluth, though but seven miles from Superior, it is the farthest inland point and accordingly boats are destined for it as the terminus, and not for Superior. So long as Duluth continues to maintain its harbor facilities and remain the farthest inland point it will control the lion's share of commerce of the Duluth-Superior harbor. Duluth lies on the farther or western bank of the St. Louis River, and though but a short distance across is Superior, with an equally good dock frontage, the Duluth side has, by virtue of its geographic position, naturally developed much more rapidly.

Population. The population of Duluth is heterogeneous. Among the various types of peoples, the Scandinavians and Canadians are found in largest numbers. Of those people who are actively engaged in the control of the business and public affairs of the city, essentially all are still of the original generation of settlers. The city is not yet old enough for the second generation to take the leading part in its movements. Of the first generation, essentially all are either foreign-born or natives of the Eastern and Central States.

With a mixture of a wide variety of peoples, a complex mass of ideas necessarily accumulates. Adjustment of different peoples to the same natural environments is in process. Such adjustments may be completed upon a compromise or balance of different ideas, conservative, progressive and retrogressive. The result of this fusion of thought in a community of generally strong, vigorous, energetic peoples is almost certain to be in favor of progress. In the case of Duluth, just that progressive spirit has resulted. The preponderance of a type of people, namely, the Scandinavians, who are accustomed in their home country to the rigors of this northerly clime, makes for a population that does not easily succumb to hardships, but rather overcomes them.

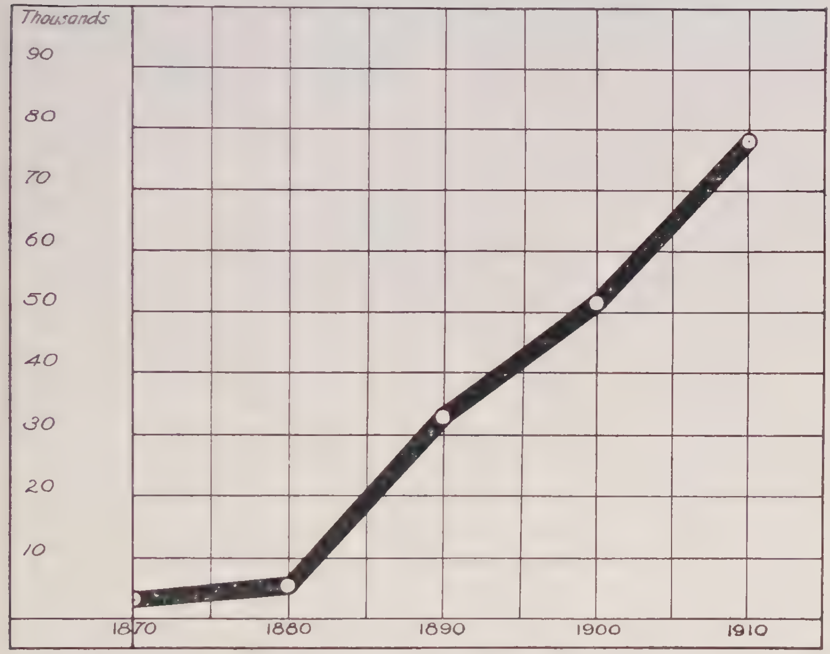

Fig. 19—Increase of Population. Duluth, 1870–1910.—U. S. Census.

The rapid growth of the city is shown strikingly in Fig. 19, the absolute increase in population, and Fig. 20, the per cent. of increase in population. Duluth has held to the pace set by the world's largest port cities and has passed the State of Minnesota. For the decade of 1900-1910 the per cent. of increase was larger than that of either the State, London, New York or Chicago.

The distribution of population within the city is interesting. The industrial establishments are located along that part of the harbor which borders the southwest end (called West End) of the city. The northeast end (called East End) is located beyond the harbor, along the shore of the broad expanse of lake. The laboring class lives near its place of business; the wealthier class as a whole lives at a distance from its place of business. This does not imply a difference in the quality of citizenship, but illustrates, in part at least, the principle of the effect of the localization of industries upon the localization of types and kinds of people. The East End is an almost exclusive residence district, whereas the West End is peopled by a mixed or middle class of people.

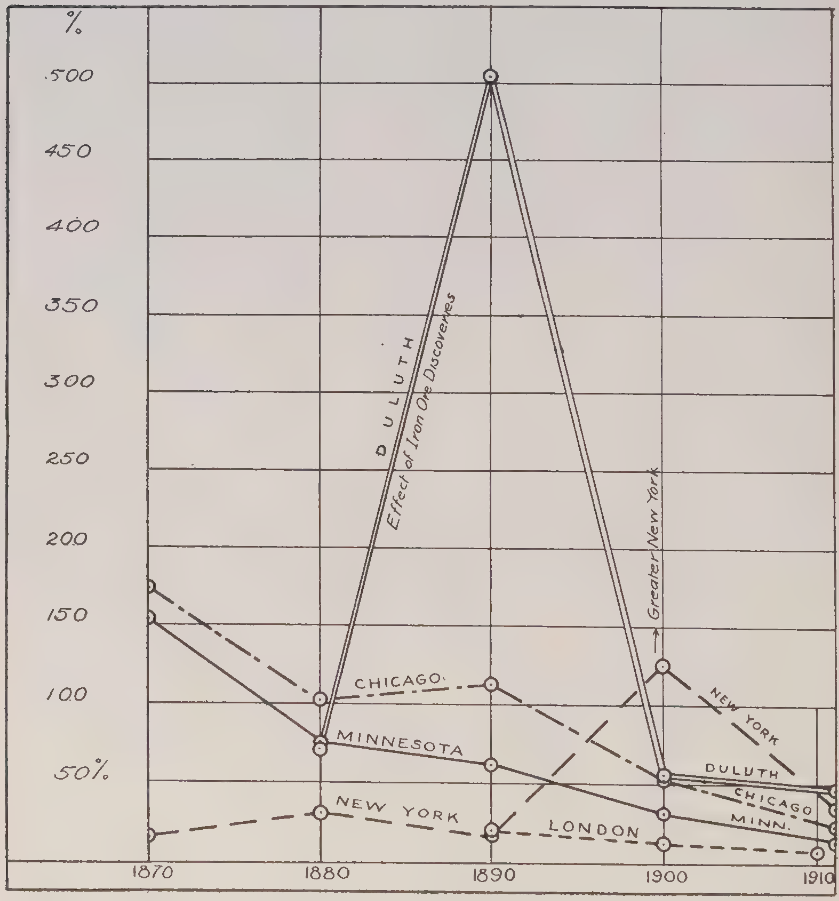

FIG. 20—Comparison of per cent. of increase in population for port cities and Minnesota. Note that Duluth's rate of increase has kept pace with other leading ports and its own state.

Permanence of Duluth. The permanence of any city is dependent upon the available food supply. Mineral resources are exhaustible and therefore will buy food only for a limited period. Mineral resources alone do not invite a large population; they must be accompanied by food to support the people who market them. Duluth has a mineral resource of highest value, but at present it is unaccompanied by extensive food supplies. Foodstuffs must be brought from miles around. This means that freight charges are added to the selling prices, for which the consumer must pay. It is universally true that the mass of the people who can earn a living in almost any locality will choose that place where the cost of living is lowest. Food and clothing constitute the largest expense of the average individual. Therefore, despite the valuable resources and the bright prospects for much work ahead, working men are not attracted if food and clothing are high-priced. In Duluth the iron ore, coal, grain and lumber products which are shipped to the city for distribution afford much work for many men. General merchandise stores, established to support this working class, in turn demand clerical help. But the number of people willing to come to this city for such work, as well as for other occupations, is limited owing to Duluth's lack of a home food supply. The food cost is high; the cost of clothing is likewise high.

Duluth's hinterland, that supplies the iron ore, the prime factor in the city's present stability and past growth, will soon be without ore. The citizens of this generation need to provide for those of one or two generations ahead. What is the prospect? Money is necessary for the purchase of food. With the waning suppies of iron ore, less money becomes available for the buying of food. This must result necessarily in a very great increase in the price of food, if not altogether in a scarcity of food. Under such conditions the city seems doomed. This is not mere theory. Cities in the history of the world have risen to great prominence; have built wonderful edifices; have reigned supreme, only later to fall into decay. There may be skyscrapers built; there may be unexcelled steel structures erected; but if the food is prohibitive because of its cost to the citizens, those signs of progress, it seems, must come to an end. Thriving cities not far distant from Duluth, located in iron ore districts, have risen during the past twenty-five years, but now, because their sole resource is disappearing and agriculture is impossible, they are decaying rapidly.

What, then, are the future possibilities of Duluth? The shipping facilities are unexcelled for trade in all directions. With the opening of the Georgian Bay canal by the Canadian government (Fig. 1) boats will come direct from Europe to Duluth. They may transfer their cargo here for Western ports, whence they may be shipped across the Pacific Ocean to the Orient.

The total distance by boat to Liverpool, via this canal and the St. Lawrence River and Atlantic Ocean, will be 4,208 statute miles.* The distance to-day from New York to Liverpool is 3,571 miles, only 637 miles nearer. The total distance between Duluth and Liverpool, via lake and New York Central Railway from Buffalo to New York, is 4,996 miles, or 788 miles farther than via the proposed new route. The new route will permit a much more rapid and less expensive transit between Europe, the East and the West. Chicago will no longer be the sole distributing center for the western country but will have to share its trade with Duluth.

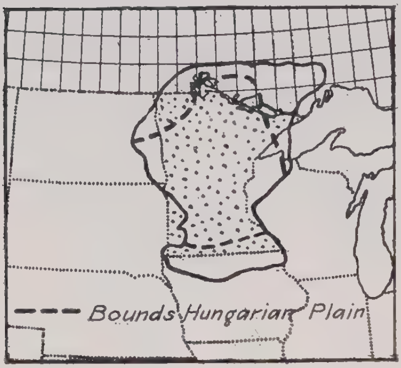

FIG. 21—Hungary superposed on Minnesota and oriented so as to bring the plains area coincident with the plains of Minnesota.

Agricultural Possibilities. An effort is made in the above discussion to show that Duluth has favorable climatic conditions for man. It can be demonstrated that it possesses a climate favorable to the cultivation of truck garden products, favorable to the dairying industry, and even to the production of wheat on a large scale. At present, farmers are actually gaining very successful returns from local production. What might be done in Duluth's hinterland and the State as a whole is best illustrated by a comparison of Minnesota with Hungary (Fig. 21). Hungary has an area of 109,007 square miles, compared with Minnesota's 87,000 square miles. In 1900 it had a population equal to 19,254,559. In 1910 Minnesota had a population equal to 2,075,708. Of the total population in Hungary, 6,055,390 were engaged in agriculture and 13,175,083 were supported by it. Hungary's iron ore resource is very small compared with Minnesota's. The country is agricultural throughout. In Fig. 21 Hungary has been oriented so that the agricultural area, namely, the Valley of the Danube, indicated by the broken line, coincides almost exactly with agricultural Minnesota. Wheat is the principal crop of Hungary. Wheat is the principal crop of Minnesota. Hungary raises a variety of other crops, thus enabling it to supply all of its people with a variety of food at low cost. In fact, it goes so far as to levy a tariff upon most imported foodstuffs. Minnesota can grow a variety of crops also.

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* "Georgian Bay Ship Canal Survey." Department of Public Works, Ottawa, Canada.

The latitude of the Danube Valley, or Hungarian plain, is essentially the same as that of Minnesota extending from about 45°N. to 49°N. The country is sufficiently far from the seas to possess a climate largely continental in character—not unlike that of Minnesota. If Hungary is capable of producing results such as mentioned, the possibilities in Minnesota, which possesses perhaps a far greater progressive spirit, seem almost unlimited. Surely a population many times the present can be supported at a low cost; Duluth need not be at any time subject to the catastrophe of decay even after the last pound of iron ore is shipped. If the citizens develop their agricultural hinterland, they may continue to bend their energies fearlessly toward the upbuilding of a great distributing center; they may safely proceed to develop the city as a manufacturing metropolis. Although there is no coal, there are 80,000 potential horse-power in the falls of the St. Louis River; 45,000 horse-power are now available, and nearly all in use.

The permanence of Duluth lies not in its iron ore resource but in its ability to secure a permanent food supply. That assured, all its other exceptional facilities may be developed without limit and a city of millions may grow.

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A NEW MAP OF THE AMERICAN SAMOAN ISLANDS

In the April, 1912, number of *Petermanns Mitteilungen* a new map was published of Tutuila and of the Manua group of the Samoan Islands which embodies the results of original surveys made in December, 1910, by Dr. Kurt Wegener of the German seismological observatory at Apia. In view of the fact that these islands belong to the United States and that Dr. Wegener's delineation of them differs considerably from that on the relevant charts published by the Hydrographic Office, the map from *Petermanns Mitteilungen* (in two sections: one showing Tutuila and the other the Manua group) is reproduced herewith. The publication of this map seems all the more timely as, according to recent correspondence with the bureaus concerned, the U. S. Coast and Geodetic Survey, under whose jurisdiction would fall the survey of the coasts of these islands since their cession to the United States in 1900, is not contemplating a survey of the islands at present owing to other claims on its time, and the U. S. Hydrographic Office, under whose auspices the only extant official American maps of the islands or of parts of them are published, is likewise contemplating no extensive resurvey in the

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near future, although minor surveying operations may be undertaken from time to time.

The official maps referred to are the general map of Tutuila and of the Manua group on the mean meridional scale of 1:145,000 (U. S. Hydrographic Office Chart No. 90), which goes back to the surveys made in 1839 by the U. S. Exploring Expedition under Commander Wilkes, and Charts Nos. 92, 93, 2563 and 2637 of the same office. Charts Nos. 92 and 93 consist of inset maps of bays and of other details of navigational interest and are based in part on the work of the Wilkes Expedition and in part on later American and British surveys. These later surveys have, as a rule, not been incorporated on the general map of the island; reference is made, however, at the corresponding places to the proper inset maps. Chart No. 2563, on the scale of 1:8,400, is a detailed map of Pago Pago Harbor based on recent surveys by officers of the U. S. Navy between 1901 and 1910. Chart No. 2637, which supersedes former Chart No. 229, is a map of Leone Bay, on the southwestern coast of Tutuila, on the scale of 1:9,200, based on a survey by the U. S. S. *Annapolis* in 1909.

A comparison of Dr. Wegener's map with the general map of the islands published by the Hydrographic Office at first glance reveals a noticeable discrepancy in the representation of the size of the individual islands. While the former map is on the scale of 1:100,000 and the latter on that of 1:145,000, Tau (or Manua) Island, for instance, is of about the same absolute size, irrespective of scale, on both maps. The difference in size, too, between Tau on the one hand and Ofu and Olosenga on the other, is much greater on the Hydrographic Office chart than on Dr. Wegener's map. In the note accompanying his map (*Pet. Mitt.*, Vol. 58, I, pp. 208-209) Dr. Wegener refers to the evident incorrectness of this ratio on present charts. The following table, based on approximate measurement by the method of squares (which should, of course, before final acceptance be verified by planimetric measurement), will elucidate these differences:

COMPARATIVE TABLE OF THE AREAS OF THE AMERICAN SAMOAN ISLANDS

	U. S. HYDROGR. OFFICE Sq. miles	WEGENER Sq. miles
Tutuila	49.2	50.5
Aunuu	0.4	0.4
Ofu	1.8	2.8
Olosenga	0.6	2.2
Tau (Manua)	19.1	8.6
	71.1	64.5

While the area of Tutuila and of the small island of Aunuu will thus be seen to be practically the same on both maps, the two sources are not in accord with regard to the area of the remaining Samoan Islands belonging to the United States (the detached atoll Rose Island in 14°32′ S. and 168°11′ W. is here not considered). Ofu is about one and one-half times and Olosenga even three and one-half times as large on Dr. Wegener's map as on the Hydrographic Office chart, while Tau Island, on the contrary, is less than one half as large on the former as on the latter map. The area of our Samoan possessions (exclusive of Rose Island, whose area, not counting its barrier reef, is about 0.8 square miles)—a subject not without interest—would thus be reduced by Dr. Wegener's map from 71.1 square miles to 64.5 square miles. The corresponding areas as given in the *Statesman's Year-Book* for 1912 (p. 572) are about 54 square miles for Tutuila and about 25 square miles for Tau, Ofu and Olosenga together. The area of these three lesser islands is, respectively, 13.6 square miles according to Dr. Wegener's map and 21.5 square miles according to the Hydrographic Office chart.

Referring now to some of the more salient differences in the two delineations of the shape and of the topography of the islands, it may be said that Ofu and Olosenga on both maps are not only different in size but in shape also. Ofu is more compact in form on Dr. Wegener's map and less elongated than on the Hydrographic Office chart; Olosenga on the former is rhomboid in shape, while on the latter it is triangular. That the southern point of Olosenga should project farther south than it does on the Hydrographic Office chart is shown by the fact, to which Dr. Wegener calls attention in the note accompanying his map, that, from the interior of the cove enclosed by the southern sides of Ofu and Olosenga, Tau Island is not visible. Ofu Dr. Wegener describes as a well-preserved crater open to the northwest. The survey made by the Wilkes Expedition shows a straight ridge. Olosenga, Dr. Wegener goes on to say, is the remnant of a volcanic cone that collapsed or exploded. The semicircular cliff at whose foot lies the village of Sili probably represents the southeastern enclosing wall of the crater. The two jagged crags Muli ulu forming the eastern tip of Ofu may be a part of this wall or else may represent the ruins of a third crater lying to the north. Both the crater of Ofu and the outer slope of the crater of Olosenga are occupied by native plantations.

Tau Island is also a crater: it is the best preserved of the group. A spur (called Utu Manua on Dr. Wegener's map) is represented as projecting from its northeastern corner on the Hydrographic Office chart. This is incorrect, says Dr. Wegener. A cove thus indicated south of it does not exist. This is the reason why the roadstead of the village of Tau is entirely unprotected against northerly winds. Dr. Wegener did not personally visit the southern, eastern or northern coasts of Tau Island. His map here is based on the statements of the local pilot Stephany.

Tutuila is described as being essentially a deeply dissected lava plateau. The ridges which have been carved out of this plateau are very differently represented on the two maps. On the Hydrographic Office chart they appear on the whole as isolated peaks capping a series of parallel ridges following the trend of the island, while on Dr. Wegener's map the interior relief of the island is represented rather as a single broad ridge from which subsidiary spurs project.

The greatest discrepancy between the two maps with regard to the topography of Tutuila relates to the island's southernmost prong. This is represented on Chart No. 90 as a mountainous district ending in a sharp point to the southwest: on Dr. Wegener's map it assumes the character of a flat foreland sheltering a line of villages on its inner side and bounded on its outer side by two craters, half of one of which is missing, so that a cross section of the crater may be seen from the sea. That the sharp point shown on Chart No. 90 is not the prominent projection it is there represented to be is evident from Chart No. 2637. On this recent chart (whose delineation has not yet been incorporated on Chart No. 90) this point (termed Leone Point, the equivalent of the point at Tua ulu on Dr. Wegener's map) is rather a subsidiary promontory lying at the junction of a N.N.W. and of an E.S.E. trending portion of the coast—if the gray color indicating land on Chart No. 2637 may so be interpreted with regard to this latter part of the coast-line, which was not included in the recent survey. This delineation, which, because of its large scale and its recent date, may be taken to be the most correct representation extant of this part of Tutuila, corroborates Dr. Wegener's survey. (Chart No. 2637, although based on a survey made in 1909, was not published until May, 1911. Dr. Wegener's survey was made, it will be remembered, in December, 1910.) The discrepant representation on the current edition of Chart No. 90 is taken from the survey of Leone Bay made in 1872 by Commander R. W. Meade of the U. S. S. *Narragansett*, formerly published as Chart No. 229. The probable inaccuracy in the representation of Leone Point may, in this case, be due to the greater inexactness often prevalent in the marginal regions of a survey.

Chart No. 2637 unfortunately gives no clue as to the configuration of the coast east of Leone Point. That here, too, there is urgent need of a resurvey is evidenced by the fact that on the current edition of Chart No. 90 this coast is stated to be reported to extend farther seaward; its supposed position is indicated on the chart by a line which emphasizes still more the southwestern projection of the foreland in general and of Leone Point in particular. The fallacy of this last representation may be assumed to be proved by the delineation on Chart No. 2637. That the entire foreland should likewise extend farther southwest also seems improbable. The implied southeastern trend of the coast line east of Leone Point on Chart No. 2637 bears this out. Furthermore, the statement that the foreland projects still farther southwest seems so improbable to Dr. Wegener that he cannot but interpret its reproduction on the German Admiralty Chart available to him as a typographic error. He thinks northeast must be meant. His map carries out this opinion. An additional indication of the improbability of a southwestern extension of the foreland is found in the original delineation of this region according to the survey of the Wilkes Expedition as given on editions of Chart No. 90 published prior to 1872. Here the foreland is more rounded in shape and, in this, resembles the representation on Dr. Wegener's map. The need of a resurvey of this region in particular is further evidenced by the fact that the southern promontory of the foreland bears two lights which, according to the current edition of Chart No. 90, are the guide lights for the approach to Tutuila from the west, specifically for reaching Pago Pago from Apia, the chief town of the Samoan Islands on the German island of Upolu. The uncertainty of the position of these lights (explicitly referred to on Chart No. 90) might well involve danger to navigation.

Several minor differences in the two maps may also be noted here. On Dr. Wegener's map Pola Island (termed Vatia Island on the Hydrographic Office chart) continues the northeast trend of the spur on the north shore of Tutuila, with which it is evidently allied; on Chart No. 90 this island has an exact north-south trend. This representation is repeated on the inset of Vatia Anchorage on Chart No. 92, which is based on a survey of 1900. Another difference concerns the representation of Aunuu Island. On Charts Nos. 90 and 93 Aunuu is roughly triangular in form with an apex directed northwest towards the mainland of Tutuila. Dr. Wegener represents the island as circular and describes it as a crater. Aunuu, too, is not without interest to navigators, as it bears a light illuminating the eastern approach to Tutuila. Of the two altitudes alone given on Dr. Wegener's map one differs from that given on the Hydrographic Office chart. To Matafao Peak, guarding the entrance to Pago Pago Harbor on the west, Dr. Wegener assigns 650 meters (the '5' is shown in reflected image on his map), the exact equivalent of the 2,133 feet of Chart No. 2563. Dr. Wegener's figure for Peoa (Pioa) Peak, to the east of the harbor, is 500 meters (the '5' on the map has undergone the same fate as its companion), or 1,640 feet. Chart No. 2563 gives 1,719 feet. It may be noted that the corresponding figures on a chart of the approach to Pago Pago, which also goes back to a survey by the U. S. S. *Narragansett* (shown on Chart No. 93), are, respectively, for Matafao Peak, 2,353 feet, and for Peoa Peak, 1,470 feet.

In his delineation of the most important part of Tutuila, Pago Pago Harbor (on Dr. Wegener's map, Fangaloa Bucht), Dr. Wegener differs considerably from the new detailed survey of that harbor published in September, 1910, by the Hydrographic Office as Chart No. 2563, already referred to. This difference mainly concerns the delineation of the western shore of the entrance to the harbor, especially of the cove forming the approach to Fa(n)gaalu. On Dr. Wegener's map this shore is less indented than it should be—for that Chart No. 2563, because of its much larger scale, is the superior authority in this case, there can be no doubt. Another case of a noticeable discrepancy between Dr. Wegener's map and a recent and undoubtedly more correct survey is to be found in his delineation of the southern coast of the western end of Tutuila between Utumea and Leone. On Chart No. 2637 this coast-line is much more indented by reentrant coves than on Dr. Wegener's map; this is particularly the case with the cove at whose head lies the hamlet of Seetana (Seetuga on Chart No. 2637). The general trend of this coast, furthermore, on the Hydrographic Office chart is E.S.E., while on Dr. Wegener's map it is practically east.

It is to be regretted that the note accompanying Dr. Wegener's map, which, for the most part, deals with the worthy subject of establishing the proper rendering of native names, does not contain a more detailed explanation of the differences between his map and existing charts. It would then be possible to know whether Charts Nos. 2563 and 2637 were consulted—as it was in all probability possible to do, if not prior to the date of his survey, at least before the final compilation of his map, as the former chart was published in September, 1910, and the latter in May, 1911—and, if so, what the reasons for the differences were.

However, the differences between the relevant portions of Dr. Wegener's map and the evidently more correct delineations on the recent charts of the Hydrographic Office affect only a relatively small part of the area considered and, therefore, need not be taken as a criterion for an unfavorable judgment of the remainder of his work. These differences should rather, as has been the aim of the above lines, emphasize the urgent necessity of a thorough general resurvey of all the Samoan Islands belonging to the United States.

W. L. G. J.

INSTRUCTION IN GEOGRAPHICAL SURVEYING

BY

I. N. DRACOPOLI

With the exception of the Royal Geographical Society of London, there is perhaps no school or college in English speaking countries where a private person may obtain efficient tuition in geographical surveying. The ordinary land surveyor cannot give adequate instruction, for astronomical observations have no part in his line of work and his methods are cumbersome and unsuitable when applied to large areas. It was to supply this need that the Council of the Royal Geographical Society appointed an instructor, Mr. E. A. Reeves, in surveying and map-making and arranged a course of work, which, when mastered, enables an explorer to profit by all his opportunities and to make as accurate and complete a survey as his time and means allow. The following is an outline of the work required:

Practical Astronomy. (*a*) Latitude.—Observations with the sextant and theodolite, including the adjustments, and finding index and level error. Computation of latitude by meridian altitudes of sun and stars, by circum-meridional altitudes, by Polaris and double altitudes. (*b*) Longitude and Time.—Observations with sextant and theodolite, and computations for finding local time by sun and stars, and thence the longitude; equal altitudes of the sun and stars for finding error and rate of watch. Telegraphic determinations of difference of longitude. Longitude by occultations of stars by the moon, and the prediction of the circumstances of occultations; longitude by meridian distances. The principle of longitude by moon culminating stars by eclipses of Jupiter's satellites and lunar distances; (*c*) Azimuths.—Azimuth by star and sun, theodolite and sextant observations. Error of compass from the observed bearing of the sun and the computed true bearing of the sun.

Surveying. Triangulating and traversing with theodolite with their adjustments. Measurement of base-line. Latitude and Azimuth Traverses. Geodetic Latitudes and Longitudes. Astronomical Base-line. Computing the position of distant points observed with theodolite from the ends of a base-line, and plotting the same on projected plane-table sheet. Plane-table surveying, including different methods of orienting the table, finding position and continuing survey from points previously fixed by triangulation. Tacheometer surveying and finding the value of divisions of micrometer. Route surveying with prismatic compass. Keeping the field-book. Levelling and computation of heights from observed vertical angles, allowing for curvature and refraction, from barometer and boiling-point observations. Contouring, drawing contour lines, and vertical sections from them. Principle of photographic surveying.

Map Projections, Plotting and Map Drawing. Construction of the more useful map-projections, including the investigation of their principles. Plotting surveys from field-books. Map drawing with special reference to the delineation of topographical features. Scales of maps, and the construction of diagonal and other scales.

The student, at his examination, is required to produce maps plotted and drawn by himself entirely from his own surveys in which he has used all the instruments mentioned above, and to show specimens of drawings of different topographical features. These maps are generally three in number, one on the scale of 1:125,000 of a piece of country half a degree square, with contour lines at intervals of 200 feet; one on the scale of 1:5,000 of some small range of hills, with contour lines at intervals of four feet; and one a large scale map of some section of a town. The candidate must show all his notes and his observations, and unless these maps are satisfactory he will not be allowed to present himself for the final and oral examination. At the latter, he is expected to answer questions asked by the committee on any of the subjects here mentioned. He is also required to produce at least one example of each of the astronomical observations referred to above, taken and computed by himself, and to draw the geometrical figure representing each case to show that he has an intelligent understanding of the subject. If desired, he will in the presence of the committee take an observation and compute the result. The time devoted to each subject must vary according to the individual capacity of the student and other circumstances, but before presenting himself for examination he is kept at each subject until he understands it and has done the practical work required.

Courses in geology, botany, zoology, anthropological measurements, photography and meteorology, also give explorers careful training in these phases of field work. All lessons are given at sixty cents an hour.

The intending traveler may thus prepare himself thoroughly to profit by any opportunities he may meet at a very moderate cost. Many eminent explorers have been pupils of Mr. Reeves, among them, Mr. Shackleton, Mr. Boyd Alexander, famous for his journey from the Niger to the Nile, Mr. Douglas Carruthers, well known for his work in Asia and Arabia, and Major Fawcett, who has been exploring the region around the Heath River in South America. This effort by the Royal Geographical Society to help explorers has been most successful, judged by its results, and might with advantage be imitated by the geographical societies of other countries.

THE SWEDISH SOUTH POLAR EXPEDITION*

A REVIEW

This initial number of the scientific reports of the Swedish Antarctic Expedition, though it appears subsequently to the issue of a considerable number of parts devoted to specialized topics, furnishes the commander's general summary of geographical discoveries, combined with a report upon the morphology, glaciology, and regional geology. These subjects, though covered with some fullness, are yet regarded as summaries which are to be followed by more detailed studies.

Some knowledge of the wealth of scientific results which the Swedish expedition has furnished has already been acquired from the published popular narrative of the expedition (already in several languages), from Nordenskiöld's "Die Polarwelt," as well as from numerous papers which the commander has published in scientific journals.

After a condensed narrative of the expedition, there follows a critical résumé of earlier expeditions into the same region. The "Morrell Land" which was entered upon the map of the late Scotch Antarctic Expedition as lying to the eastward of King Oscar Coast, Nordenskiöld shows to have no existence, and severely scores Captain Bruce for rehabilitating this supposed land mass without observations to prove its existence. He also lends the weight of his authority for the use of the terms East Antarctica and West Antarctica, the latter a substitute for the veritable babel of names originally applied to and still retained for sections only of the coast and intended as monuments to earlier explorers. The recent discovery by Amundsen that King Edward Land and Victoria Land are connected, in no way destroys the value of this distinction.

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* Die Schwedische Südpolar-Expedition und ihre geographische Tätigkeit. Von Otto Nordenskjöld. *Wissensch. Ergebnisse der Schwed. Südpolar-Exped. 1901–1903*, Bd. 1, Lief. 1, 232 pp. Maps, ills. Lithogr. Inst. des Generalstabs, Stockholm, 1911. Mks. 24. 11 x 8½.

Rocks of various intrusive varieties are described which, like those already studied by the Charcot and the earlier "Belgica" expeditions, exhibit close correspondence in characters with the peculiar Andean intrusives which occur along the American cordillera from Alaska to Patagonia. In addition to these intrusive rocks, the corresponding volcanic varieties, and particularly the Andesites, are represented and are closely related to those which have been collected in Patagonia. Thus valuable confirmatory evidence is supplied for the connection of the mountain arc of the South Sandwich Islands with the Andean system.

The portion of West Antarctica which was more carefully studied by the expedition, lies about Admiralty Strait and includes the James Ross, Snow Hill and Seymour Islands. Of these, the first mentioned is much the largest and consists of basalt and basaltic tuff, whereas the other islands of the group are of flat lying sediments of Cretaceous and Tertiary age which form the basement series of the entire district. The uppermost member is a hard, dense schist metamorphosed through contact with the basalt, and beneath this schist are found in turn glauconitic sandstone, shale, hard clay-stone and sandy shale.

Perhaps the most novel and interesting features of the report have to do with the glaciers. The two larger islands are almost buried under white domes of snow and ice (*Eiskuppel*), the irregularities of the rock basement making themselves apparent, however, in marked protuberances of the white surface, though the lithosphere is found exposed only upon the margins. Of Snow Hill Island, upon which the winter quarters were located, all rock was covered save only a small area at the north-east end, and the ice dome extended out at all other margins as an ice foot resting upon the sea. Something approaching this condition appears to belong to the islands of Franz Josef Land within the Arctic region.

Throughout a period of eighteen months measurements were made both upon the rate of accumulation of snow and upon the lateral movement of surface portions of the Snow Hill ice dome at localities about a kilometer back from its margin. Only one of the bamboo rods used for these tests betrayed any appreciable lateral movement during this entire period, and its migration could have been at most but a small fraction of an inch per day. Though the methods used lacked precision, the results may still be interpreted to show that the motion of this ice cap even near its margin is excessively sluggish.

The normal section of the materials composing the glacier of Snow Hill Island possesses considerable interest. Beginning at the top it consists of: (*a*) a thin cover of snow modelled in snow drifts and fixed sastrugi; (*b*) a crust of firmer ice often possessing a coarse, granular cell structure and so thin that the foot sinks through it; (*c*) a layer of variable thickness consisting of snow of the preceding summer and a beautiful alternation of thin laminæ of partially consolidated ice and of névé snow; (*d*) a layer of stratified névé ice varying from nothing to a thickness of twenty meters; and (*e*) the true glacier ice. The borders of the ice dome which covers James Ross Island are curiously indented by broad cirque-like amphitheatres which expose the steep rock wall beneath the even surface of the ice dome above. These amphitheatral depressions of the marginal portion of the great ice dome are occupied by glaciers of a new type, the nourishment of which offers interesting problems. In each case one or more narrow ice cascades descend over the wall of the amphitheatre from the glacier dome above. The largest of these glaciers and the one chosen as the type is the Hobbs Glacier, ten km. long, with a wall at the front which is three km. broad. The steep to vertical rock wall everywhere rises above the glacier to the ice dome above except where two narrow cascades connect the higher and lower ice masses. Essentially the same characters are possessed by the Gourdon and Rabot glaciers. Concerning the nourishment of these interesting ice streams, Nordenskiöld says, "they represent a peculiar type of mountain glacier, and above all, a type of very large deep-lying cirque glacier which is nourished both by snow avalanches and ice cascades and by local precipitation."

Nordenskiöld's monograph furnishes the first full account of the shelf ice of the King Oscar coast, and this, he believes, was formed through the loading of sea ice by surface snow precipitated in successive seasons. Studies carried out upon Larsen Bay indicate that there shelf ice of this character is now in process of formation. The main platform of shelf ice, described as the "lower terrace," embraces about 10,000 square miles and has a gentle slope outward from the land and from the higher terrace to the southward, in which respect it differs notably from the shelf ice of the Great Ross Barrier between King Edward and Victoria Lands. Thus to the northward it rises about fifteen meters above sea level, in its central portions it has an estimated elevation of thirty meters, and near the land to the southwest, forty to forty-five meters. Only in the neighborhood of the land does its surface vary from a level plain, but upon this margin it presents notable undulations and often local fissures. From examination of the latter it was learned that the shelf ice there consists of a very regular alternation of blue and white ice layers. To the southward toward the higher ice mass of Jason Land it consists of beautifully bedded layers of névé ice. Nordenskiöld believes the shelf ice to be either floating or resting upon the shallow sea bottom, the outward slope of the upper surface greatly favoring, as it seems to the reviewer, the latter view. Toward the northeast, volcanic islands—the Seal Nunataks—are included. That the shelf ice is in motion outward from the land, Nordenskiöld believes to be proven both by the absence of the compression zone and the presence of numerous fissures along the land margin. Above the shelf ice to the southward is a higher mass of ice—the "higher terrace"—which rises in steps from the shelf ice and has at the base of each step a system of deep and wide fissures. The lowest of these steps rises a distance of some thirty to forty meters from the shelf ice, which is here some fifty meters above the sea. After three successive steps of this sort, the surface of the ice becomes flatter and the succeeding steps less prominent; but there is still an alternation of hills with flat depressions. Above the Borchgrevink Nunatak, at an elevation of more than 250 meters, the surface of the ice plateau is quite level as far as the eye can reach. This interesting body of ice Nordenskiöld has now named the Philippi Glacier in honor of the late Professor Philippi, and while he is unwilling to make a very definite assertion concerning its origin, he appears to favor the view that it is a continental glacier, and it certainly bears a close resemblance to the continental glacier of Antarctica in Kaiser Wilhelm Land.

In view of the manner of origin which Nordenskiöld has assumed for the shelf ice, and we believe that his arguments are well supported, he has included shelf ice as a distinct glacial type in the system which he adopts to apply especially to Antarctic conditions. In it he has recognized clearly the distinction between mountain and continental glaciers:

I. Glaciers of the coast zone and shelf. (*a*) Ice foot glaciers; (*b*) shelf ice.

II. Continental glaciers. (*c*) Inland ice.

III. Transitional forms between continental and mountain glaciers. (*d*) Highland glaciers (Norwegian type); (*e*) true Piedmont glaciers; (*f*) Spitzbergen type.

IV. Mountain glaciers.

Under the head of mountain glaciers, Antarctica furnishes a number of rather special types, among which the Spitzbergen variety, which is almost an ice cap, is particularly common.

Among the many other interesting problems which are treated in this report, perhaps the most novel and instructive are included under the heading "Frost weathering, earth flow, and striped ground." Attention is now being strongly focussed upon this newly exploited series of geological properties having a special application in those high latitude districts where the ground is only partially snow-covered during the warmer months of the year. The pictures which illustrate this section are the finest that have yet been published of "polygonal ground" and "striped ground." Nordenskiöld has shown that these two contrasting types of ground are connected through gradational varieties and are characteristic respectively of flat and sloping surfaces. His studies have further proven that these striking phenomena are notably superficial in character, being restricted to a layer of soil at most a half meter in thickness, which, when saturated with thaw water, slides over the permanently frozen underlying materials. In common with other recent workers upon the subject, he has suggested that regelation may play an important rôle in the migration of the soil and in the differential movements of the rock fragments. Experiments carried out at Snow Hill show that the motions to which these curious structures are due are too slow to be perceived during the period that the station was occupied.

Of the important section of the monograph which deals with the development of surface features upon the land, there remains space only to refer to the striking analogy between these cold humid deserts and the hot and dry areas of lower latitudes. To replace the natural sand blast of the better known deserts which etches out hollows over the softer rock materials, there is here a blast of tuff fragments driven by the Antarctic blizzards which leaves similarly hollowed surfaces on exposed rock masses wherever softer materials are found associated with harder ones. The most that can be done in a review of this nature is to touch a few of the high points in this notable monograph.

William H. Hobbs.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

THE LIBRARY. For some months, Dr. Randall-MacIver has been engaged in the classification and re-arrangement of the Society's book collections. This work, now completed, will greatly facilitate reference to any of the many thousands of volumes on the shelves. Works on regional geography are arranged by continents and their subdivisions. The various departments of our subject, such as physical, educational, economic and historical geography, etc., have each its own group of shelves. Government surveys and other official scientific publications form a group and are sub-classified by countries and topics. The publications of geographical and allied societies are arranged according to the languages in which they are printed. The general content of each stack section is lettered on the end of the stacks facing the central passageways. Nearly all the reference books are to be kept in the work rooms from which they may conveniently be distributed to consultants.

THE SOCIETY'S GEOGRAPHICAL COLLECTION. This collection, illustrating the best school material used for geographical education in Europe, has now been exhibited in many schools from the Atlantic to the Pacific coast during the past two years. The exhibition at Oberlin College has just closed and the collection has been ordered home to repair the wear and tear of handling by many thousands of visitors. Two or three exhibitions of it are likely to be given in this city, before it goes on the road again. Prof. George D. Hubbard of Oberlin writes that the map and atlas collection was very much enjoyed there, was continuously on exhibition for two months and was not only studied by students of Oberlin but was visited by many townspeople.

NORTH AMERICA

POPULATION OF CITIES IN THE UNITED STATES. The Bureau of the Census has just issued a *Bulletin* entitled: "Population: United States. Abstract of Statistics of the Number and Distribution of Inhabitants." Much of it has already been placed before the country, but considerable new data are given in Table 8, "Population of Cities in 1910, 25,000 inhabitants, or more, with per cent. of increase, 1890-1910." The following data relating to all the more important cities of the country are taken from this *Bulletin:*

City	Population	
	1910	*1900*
ALABAMA		
Birmingham	132,685	38,415
Mobile	51,521	38,469
Montgomery	38,136	30,346
ARKANSAS		
Little Rock	45,941	38,307
CALIFORNIA		
Berkeley	40,434	13,214
Los Angeles	319,198	102,479
Oakland	150,174	66,960
Sacramento	44,696	29,282
San Diego	39,578	17,700
San Francisco	416,912	342,782
COLORADO		
Colorado Springs	29,078	21,085
Denver	213,381	133,859
Pueblo	44,395	28,157
CONNECTICUT		
Bridgeport	102,054	70,996
Hartford	98,915	79,850
Meriden City	27,265	24,296
New Britain	43,916	25,998
New Haven	133,605	108,027
Waterbury	73,141	45,859
DELAWARE		
Wilmington	87,411	76,508

City	Population 1910	Population 1900
District of Columbia		
Washington	331,069	278,718
Florida		
Jacksonville	57,699	28,429
Tampa	37,782	15,839
Georgia		
Atlanta	154,839	89,872
Augusta	41,040	30,441
Macon	40,005	23,272
Savannah	65,064	54,244
Illinois		
Aurora	29,807	24,147
Chicago	2,185,283	1,698,575
Decatur	31,140	20,754
East St. Louis	58,547	29,655
Joliet	34,670	29,353
Peoria	66,950	56,100
Quincy	36,587	36,252
Rockford	45,401	31,051
Springfield	51,678	34,159
Indiana		
Evansville	69,647	59,007
Fort Wayne	63,933	45,115
Indianapolis	233,650	169,164
South Bend	53,684	35,999
Terre Haute	58,157	36,673
Iowa		
Cedar Rapids	32,811	25,656
Council Bluffs	29,292	25,802
Davenport	43,028	35,254
Des Moines	86,368	62,139
Dubuque	38,494	36,297
Sioux City	47,828	33,111
Kansas		
Kansas City	82,331	51,418
Topeka	43,684	33,608
Wichita	52,450	24,671
Kentucky		
Covington	53,270	42,938
Lexington	35,099	26,369
Louisville	223,928	204,731
Newport	30,309	28,301
Louisiana		
New Orleans	339,075	287,104
Shreveport	28,015	16,013
Maine		
Lewiston	26,247	23,761
Portland	58,571	50,145
Maryland		
Baltimore	558,485	508,957
Massachusetts		
Boston	670,585	560,892
Brockton	56,878	40,063
Cambridge	104,839	91,886
Chelsea	32,452	34,072
Fall River	119,295	104,863
Haverhill	44,115	37,175
Holyoke	57,730	45,712
Lawrence	85,892	62,559
Lowell	106,294	94,969
Lynn	89,336	68.513
Malden	44,404	33,664
New Bedford	96,652	62,442
Salem	43,697	35,956
Somerville	77,236	61,643
Springfield	88,926	62,059
Worcester	145,986	118,421

City	Population 1910	Population 1900
Michigan		
Bay City	45,166	27,628
Detroit	465,766	285,704
Grand Rapids	112,571	87,565
Kalamazoo	39,437	24,404
Lansing	31,229	16,485
Saginaw	50,510	42,345
Minnesota		
Duluth	78,466	52,969
Minneapolis	301,408	202,718
St. Paul	214,744	163,065
Missouri		
Kansas City	248,381	163,752
St. Joseph	77,403	102,979
St. Louis	687,029	575,238
Montana		
Butte	39,165	30,470
Nebraska		
Lincoln	43,973	40,169
Omaha	124,096	102,555
New Hampshire		
Manchester	70,063	56,987
Nashua	26,005	23,898
New Jersey		
Atlantic City	46,150	27,838
Bayonne	55,545	32,722
Camden	94,538	75,935
Elizabeth	73,409	52,130
Hoboken	70,324	59,364
Jersey City	267,779	206,433
Newark	347,469	246,070
Paterson	125,600	105,171
Trenton	96,815	73,307
New York		
Albany	100,253	94,151
Binghamton	48,443	39,647
Buffalo	423,715	352,387
Elmira	37,176	35,672
Mount Vernon	30,919	21,228
New Rochelle	28,867	14,720
New York	4,766,883	3,437,202
Manhattan Borough	2,331,542	1,850,093
Bronx Borough	430,980	200,507
Brooklyn Borough	1,634,351	1,166,582
Queens Borough	284,041	152,999
Richmond Borough	85,969	67,021
Niagara Falls	30,445	19,457
Poughkeepsie	27,936	24,029
Rochester	218,149	162,608
Schenectady	72,826	31,682
Syracuse	137,249	108,374
Troy	76,813	60,651
Utica	74,419	56,382
Yonkers	79,803	47,931
North Carolina		
Charlotte	34,014	18,091
Wilmington	25,748	20,976
Ohio		
Akron	69,067	42,728
Canton	50,217	30,667
Cincinnati	363,591	325,902
Cleveland	560,663	381,768
Columbus	181,511	125,560
Dayton	116,577	85,333
Springfield	46,921	38,253
Toledo	168,497	131,822
Youngstown	79,066	44,885
Oklahoma		
Muskogee	25,278	4,254
Oklahoma City	64,205	10,037

CITY	POPULATION	
	1910	*1900*
OREGON		
Portland	207,214	90,426
PENNSYLVANIA		
Allentown	51,913	35,416
Altoona	52,127	38,973
Chester	38,537	33,988
Erie	66,525	52,733
Harrisburg	64,186	50,167
Johnstown	55,482	35,936
Lancaster	47,227	41,459
McKeesport	42,694	34,227
New Castle	36,280	28,339
Norristown	27,875	22,265
Philadelphia	1,549,008	1,293,697
Pittsburg	533,905	451,512
Reading	96,071	78,961
Scranton	129,867	102,026
Wilkes-Barre	67,105	51,721
York	44,750	33,708
RHODE ISLAND		
Newport	27,149	22,441
Pawtucket	51,622	39,231
Providence	224,326	175,597
Woonsocket	38,125	28,204
SOUTH CAROLINA		
Charleston	58,833	55,807
Columbia	26,319	21,108
TENNESSEE		
Chattanooga	44,604	30,154
Knoxville	36,346	32,637
Memphis	131,105	102,320
Nashville	110,364	80,865
TEXAS		
Austin	29,860	22,258
Dallas	92,104	42,638
El Paso	39,279	15,906
Fort Worth	73,312	26,688
Galveston	36,981	37,789
Houston	78,800	44,633
San Antonio	96,614	53,321
UTAH		
Salt Lake City	92,777	53,531
VIRGINIA		
Lynchburg	29,494	18,891
Norfolk	67,452	46,624
Richmond	127,628	85,050
Roanoke	34,874	21,495
WASHINGTON		
Seattle	237,194	80,671
Spokane	104,402	36,848
Tacoma	83,743	37,714
WEST VIRGINIA		
Huntington	31,161	11,923
Wheeling	41,641	38,878
WISCONSIN		
La Crosse	30,417	28,895
Madison	25,531	19,164
Milwaukee	373,857	285,315
Oshkosh	33,062	28,284
Racine	38,002	29,102
Superior	40,384	31,091

FROST PREVENTION IN NEVADA. The Department of Meteorology and Climatology of the University of Nevada, under the direction of Professors J. E. Church, Jr., and S. P. Fergusson, is carrying on an extended investigation of the conditions of frost occurrence and of the methods of frost prevention in Nevada. In connection with this work, a "temperature survey" of the valley lands of the State is being made, for the purpose of discovering districts thermally adapted for the raising of fruits. The results thus far obtained have been published recently (*Bull.* 79, Agric. Exp. Sta., Univ. of Nev., 1912), and much information of general value to fruit growers in other States also is given. This bulletin is intended "for the definite purpose of bringing conviction to the minds of Nevada fruit growers that fruit can be successfully grown even in seasons when frosts are persistent and destructive, and in places considered more unfavorable than any at present occupied by orchards." Experiments have shown that orchards in Nevada, even when the temperature falls as low as 22° F. and frosts occur persistently, can be protected during the season at an expense varying from seventy-three to ninety-five cents per tree. This estimate includes one-tenth of the original cost of the heaters with fifty per cent. added for depreciation and interest, but does not include possible expense for extra labor. In an orchard of 250 trees, the average expense for each of 13 heatings was 5.6 cents per tree.

Windbreaks of Russian oleasters, lopped poplars or willows and Lombardy poplars are a great help in economical and effective orchard heating, and are absolutely essential to success wherever the wind is strong. By means of recording thermometers, or a set of maximum and minimum thermometers, frost can be predicted with reasonable certainty. By using an automatic frost alarm, the exhaustion attendant upon "night watching" can be avoided. According to a temperature survey of the Truckee Meadows, and the climatological records of the Weather Bureau, the Humboldt, Truckee, Carson, Walker and Vegas Basins contain areas that can be adapted by orchard heating to the raising of fruit.

R. DEC. WARD.

PRECIPITATION AND STREAM-FLOW OF THE OHIO RIVER AT CINCINNATI. Professor J. Warren Smith, of the U. S. Weather Bureau at Columbus, Ohio, has investigated "The Relation between the Precipitation over the Watershed of the Ohio River above and the Stream-Flow at Cincinnati" (*Bull.* No. 40, U. S. Weather Bureau, 1912). The period covered is 50 years, from 1861 to 1910, inclusive. The data are tabulated for each month of each year; for combinations of months for each year of the entire period; for each month of 10-year and 25-year groups of years. The conclusions reached are as follows, the author saying that these statements "are proven beyond dispute." There has been a very slight decrease in flood days in recent years, with the same rainfall. The same amount of rainfall causes a better flow of water in the river during the low-water period than formerly. The number of low-water days was 14 per cent. less during the past twenty-five years than during the preceding twenty-five, calculating for the same rainfall. During the ten years ending with 1910 the tendency for low water, with an equivalent rainfall, was not so great as for any preceding 10-year period for the past fifty years. Floods do not occur at Cincinnati during February and March unless the precipitation for these months is in excess of the normal, except on very rare occasions.

R. DEC. WARD.

THE FLORIDA KEYS: *Erratum.* In the article on the completion of the Florida East Coast R.R. by R. M. Harper in the February number of the *Bulletin,* Key Biscayne, southeast of Miami, was inadvertently stated (p. 90) to be the northernmost of the typical Florida keys. This designation applies to Soldier Key, about thirteen miles south of Miami in 25°35′ N. lat. and 80°10′ W. long. (cf. Coast and Geodetic Survey charts Nos. 165 and 166). Key Biscayne, on the contrary, is the southernmost of the sandy barrier beaches which fringe the east coast of Florida. Reference to this fact will be found in a discussion of the natural provinces of the state in a report by the above author in the Third Annual Report (for 1909-1910) of the Florida State Geological Survey (p. 229).

The most comprehensive account of the geology of the Florida Keys is that of Samuel Sanford in the Second Annual Report of the same survey (pp. 195-198, 214-221, 229-230), which gives many references to previous literature. Regarding the vegetation of the Florida Keys no complete description has ever been attempted, but short semi-popular papers on the subject have been published by A. H. Curtis in *Garden and Forest* for Aug. 8, 1888, and by Dr. J. K. Small in the *Journ. of the N. Y. Bot. Garden* for March, 1909, and July, 1911.

DR. JOCHELSON'S WORK IN THE ALEUTIAN ISLANDS. Among the many interesting papers to be presented to the eighteenth International Congress of Americanists, the account of the expedition of the Imperial Russian Geographical Society to Kamchatka and the Aleutian Islands, by Dr. Waldemar Jochelson, is specially worthy of note. The expedition, of which Dr. Jochelson was in charge of the ethnological section, was fitted out in 1908 at the expense of a Russian banker, M. F. P. Riobanschinsky. The expedition excavated thirteen ancient village sites and three burial caves, and explored shell-heaps and other kitchen-midden deposits of the Aleutian Islands. The collections brought back by the expedition included skeletons and skulls, and many prehistoric objects of stone and bone. In addition, much information as to the Aleutian language, folklore, and religion was secured. In 1910 the party crossed to Kamchatka, where old underground dwellings and fortifications were explored, and ancient pottery, the existence of which has been denied by former travelers, was found. The discoveries throw much light on the early relations of Kamchatka and Japan. Dr Jochelson will also discuss the morphological relations of the language of Kamchatka and of the American Indians, and the identities which he has discovered in their mythology and that of the Indians of the north-west. (*Nature, Vol. 89, 1912, No. 2221, p. 301*).

SOUTH AMERICA

Geographical Material Destroyed by Fire. In a fire at Rio de Janeiro, on Sept. 15th last, that destroyed the National Printing Establishment, the Instituto Historico e Geographico Brazileiro lost all the originals of the third volume specially devoted to the "Centenario da Imprensa no Brazil" and containing catalogues of newspapers published in many of the states of that republic. The originals of part 2 of Volume 73 of the *Revista,* being the number for 1910, were also lost. This volume was to contain, among others, an article entitled "Contribuicão para uma futura carta ou mappa do Estado de Minas Geraes" by Dr. Nelson de Senna.

AFRICA

Geographical Progress on the Libyan Coast. According to the *Rivista Geografica Italiana* for May, 1912, the Italian government steamer *Ciclope* has just completed a cruise from Tripoli to Tobruk on the North African coast. About 14,000 soundings were taken for the preparation of a chart of Tripoli harbor. The ship was subsequently detailed to an exploration of the coastal sea within the east-west limits given above. Dr. A. Manuelli was the chemist attached to the expedition, which Dr. A. Sella also accompanied as biologist. The results obtained in the course of this cruise will serve as a basis for the elaboration of a program of thalassic investigation in that region. On the other hand, work has begun in the nautical meteorologic station erected in Tripoli while the Bengazi observatory is being built under the supervision of the officials of the Royal Geographic Institute who will have charge of its work.

The Natives of the Kharga Oasis, Egypt. The Smithsonian Institution has just issued a report under this title prepared by Dr. Ales Hrdlicka, curator of physical anthropology at the National Museum, who recently spent nearly four months at this oasis in the Libyan Desert collecting his material for the report. He was sent to Kharga by the Smithsonian Institution, the National Museum and the Metropolitan Museum of New York to study the physical characteristics of the natives. The oasis is about 130 miles west of Luxor and, owing to the isolation of its people, it was believed that they might be regarded as representing the old inhabitants of the region who probably settled there about 2000 B. C. Dr. Hrdlicka examined and measured only those showing normal development and apparently free from negro admixture. Out of a total population of about 10,000, including some Bedouans, he confined his studies to 150 individuals. He found that the type of the Kharga natives is radically distinct from that of the negro. It appears to be fundamentally the same as that of the non-negroid Egyptians of the Nile Valley, is a composite of closely related northeastern African and southwestern Asiatic ethnic elements, and is to be classed as part of the southern extension of the Mediterranean subdivision of the white race.

EUROPE

THE JUNGFRAU RAILROAD. The recently completed stretch of the Jungfrau Railroad, between Eismeer and Jungfrau Joch, carries this greatest of all mountain roads far towards completion. The tunnel station of Eismeer (10,333 feet) was opened in June, 1907. The newly opened section, 2.8 miles in length, has a very steep grade, leads deeper into the mountain and reaches the tunnel station of Jungfrau Joch at an elevation of 11,304 feet. The remaining part of the railroad will be a cog line. At its final halting place the line will be 230 feet below the top of the mountain. (*Kartogr. und Schulgeogr. Zeitschr. No. 4, 1912*).

A MONUMENT TO J. JANSSEN. A Committee composed of distinguished men of science in many countries and under the presidency of M. H. Poincaré of the French Academy of Sciences has been organized to collect funds for the erection of a monument to J. Janssen, the founder of the observatory on the summit of Mont Blanc and at Meudon, and whose important contributions to physical astronomy are well known. It is designed to make the monument a work of art which will recall the eminent services rendered by Janssen to science. Societies and individuals in all countries are invited to send their contributions to the Treasurer of the Committee, Mr. M. H. Dehérain, Librarian of L'Institut de France.

POLAR

ANTARCTIC

WILKES'S WORK FULLY ENDORSED, AT LAST, BY A BRITISH AUTHORITY. Dr. William S. Bruce, of Scotland, well known for his scientific explorations both in the Arctic and the Antarctic, has a paper "The Australasian Antarctic Expedition, 1911," in *The Scottish Geographical Magazine* (June, 1912, pp. 314-318), liberal quotations from which are here made:

"News has been received in this country of the successful landing of the Australasian Antarctic Expedition, under the leadership of Dr. D. Mawson, on Adelie Land. Unfortunately, just as the American discoveries by Johnson and Morrell in the Weddell Sea were discredited without much reason in Britain during the whole of last century, so also the American discoveries to the south of the Indian Ocean made by Wilkes were discredited not only in Britain but also in Europe generally.* Anyone, however, who has carefully read Captain Wilkes's narrative must have felt that there was sufficient evidence for the American discoveries, and the writer, for one, has always upheld the view that those lands would be found to exist more or less in the position in which Wilkes charted them . . . The Mawson Australasian expedition has proved, over a distance of more or less 1,200 miles, the existence of Wilkes Land, which has been disputed during the past seventy-two years, and has set up stations at the west, and almost at the east end of it. Dr. Mawson has therefore done much to support the theory of there being one continental land-mass round about the South Pole, and as a geologist, as well versed in Australian and Antarctic geology as any living man, he will be certain to bring back a rich harvest of valuable results bearing on the formation of Antarctica. His oceanographical survey between Antarctica and Australia will also be a most valuable contribution to Geography and biology, and the meteorological and magnetic observations cannot fail to be of economic worth."

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* It should be said that many continental geographers have, for years past, accepted the discoveries of Lieut. Wilkes and recorded them in their writings and on their maps.—EDITOR BULLETIN.

From the reports sent home by Dr. Mawson, the Scottish explorer is able to make an excellent summary of the work thus far done by the Australasian expedition:

"No expedition has ventured during seventy-two years to approach this forbidding land again, until this courageous Australian launched forth, fully determined to make out what he could concerning it, and to endeavor to find what relationship it had to Victoria Land and the rest of the Antarctic Continent, as well as to Australia and New Zealand. Thus it was Mawson's plan to land three parties on this practically unknown coast, and he has, by successfully landing two parties, accomplished more than could have been hoped for by those who know. The coast was discovered by Captain d'Urville on Jan. 21, 1840, and was visited by Wilkes on Jan. 30 of the same year.* Dr. Mawson has himself landed with a party of fourteen at Point Alden, the eastern part of Adelie Land, where he has set up an encampment, and is at present spending the winter with the intention of carrying on meteorological, magnetic, geological and other scientific investigations, while exploring the land and seas in the vicinity from a topographical aspect. The reports meanwhile available give the most meager description of this interesting land, evidently because Dr. Mawson and his companions were entirely occupied in landing stores and equipment and setting up the house for winter quarters. The approach to Wilkes Land was made not without difficulty on account of fogs, snow and heavy gales. The ice-pack, also was not negotiated without difficulty. After leaving Macquarie Island and 'proceeding some days west-south-west', says Lieut. Mennis, 'we sighted a barrier very similar to the Ross Barrier, varying from forty to 100 feet in height, with an irregular edge running generally south. Afterwards, we passed rocky islets just off what appears to be the northern extremity of the southern ice-cap. On Jan. 9, while it was blowing a heavy gale, we sighted some more land jutting out from the barrier's edge, and we made for it. As there were numerous small islands and rocks just awash, and with the soundings showing a very irregular bottom, the ship was brought-to about two and a half miles out. As we were already further west than we had intended to make our main base, Dr. Mawson and I, with Bickerton and five others, lowered a whale boat and pulled in. We found the land to be the outcrop from that covered by the ice-sheet, and composed of ice-worn rocks and loose boulders and moraine, about a mile long and half that depth, the highest point being about 200 feet.'

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* "On the 19th of January, 1840, in longitude 154°30′ E., latitude 66°20′ S., Lieut. Charles Wilkes sighted, or believed that he sighted, land to the south. On the same day, in longitude 153°40′ E., latitude 66°31′ S., Lieut. Hudson also thought he saw land to the south. Other officers, among them Lieut. Alden, Gunner Williamson and Passed Midshipman Colvocoresses, made statements to the same effect. The American vessels sailed westward, and on the 22nd and 23d of January reported land again. They then continued their cruise to 97°37′ E., along this coast which Lieut. Wilkes named 'The Antarctic Continent,' and which has since justly been called Wilkes Land." (Edwin Swift Balch, *Bull. Amer. Geogr. Soc., Vol. 38, 1906, p. 30.*)

"At Point Alden, a fine boat harbor was found, and enough water for the ship to get within 200 yards, so Dr. Mawson decided to set up his first station at that point. The landing was not effected without difficulty, on account of very heavy gales and low temperature. The ice-cap in this region rises very rapidly up to about 2,000 feet, and the coast is described as a bad one, 'all heavily ice-clad and badly crevassed, fairly steep slope from about 2,000 feet, and finishing with a cliff face 100 to 300 feet. Occasionally we saw a rock in the face, but very seldom.'

"Having landed Dr. Mawson, Capt. Davis, who is master of the *Aurora,* proceeded to the westward in a more or less zig-zag course, along about the 65th degree of latitude, and about 250 miles to the westward, he discovered land rising to a height of 2,500 feet, very much of the same character as Adelie Land, but considerably further south than the land charted by Wilkes in these longitudes. It was impossible to get nearer than eighteen to twenty miles from this land on account of the close and heavy nature of the pack-ice. Consequently the *Aurora* steered a course westward, and ultimately landed a party under the leadership of Mr. Wild on about the Antarctic Circle, (66°21′ S.) in Long. 95°9′ W., 1,200 miles west of Dr. Mawson's station. It is interesting to note that this is the land, to which I have already referred, charted and called Termination Land by Captain Wilkes, whose existence has been doubted by others. It is therefore of extraordinary interest that the party of the Australasian expedition under Mr. Wild has not only confirmed Wilkes's discovery of Termination Land, but has actually landed and set up winter quarters there. The landing of this party was an even more remarkable accomplishment than the landing of Dr. Mawson's party. For one reason, it was fully a month later in the season, and was accomplished under most difficult circumstances, the stores having to be got up by means of shear-legs on to the top of a precipitous ice-cliff 100 feet high."

In landing on Termination Land, the party ascended a glacier which Mr. Wild says should eclipse the Beardmore, which Shackleton and Scott ascended, by at least fifty miles in length and fifty in width. Dr. Bruce adds that the oceanographical survey which the *Aurora* is carrying on between Australia and Wilkes Land closely resembles the work of the Scottish expedition, the special object being to make a deep-sea survey which shall indicate what previous continental connections there have been between Australia and this part of the Antarctic Continent.

AMERICAN DISCOVERERS OF THE ANTARCTIC CONTINENT. Major-General Greely, U. S. A., has an excellent paper with this title in the March number of the *National Geographic Magazine,* in which he summarizes the evidence that the original discovery of what is now known as West Antarctica was made by Nathaniel B. Palmer, of Stonington, Conn., in January, 1821. As Mr. Balch wrote in the *Bulletin* of our Society ("Stonington Antarctic Explorers", Vol. 41, 1909, pp. 473-492), Palmer, a little after his discovery, fell in with Captain Bellingshausen, commander of the Russian expedition then engaged in Antarctic explorations, and told him of the land he had found. Palmer's work was discredited in England and it has been affirmed there that the Russian captain made no reference in his book to his meeting with Palmer or to the latter's discovery; but Gen. Greely quotes from Henryk Arctowski, who said in a paper in the *Geographical Journal* (Vol. 18, 1901, pp. 353-394) that Bellingshausen did describe his meeting with Palmer in the second volume of his book, pp. 263, 264, published in 1831. It was this Russian explorer who named the part of West Antarctica which Palmer revealed, Palmer Land, and it appeared on the maps till the British replaced it by Graham Land in honor of the first Lord of the Admiralty. Palmer was the discoverer of West Antarctica, which is now believed to be a northerly projection of the Antarctic continent.

Much of General Greely's paper is given to Lieut. Wilkes's discovery of some 1,200 miles of Antarctica, his application of the name The Antarctic Continent to the great southern land mass and the campaign of abuse and detraction that was visited upon him for two generations by unfriendly critics on the other side of the Atlantic.

ECONOMIC GEOGRAPHY

WHALING IN SOUTHERN SEAS. The number of companies fishing for whale in 1912 in the south seas is about thirty-five in addition to the twenty companies in northern seas. Whales are most plentiful in southern waters around South Georgia, South Shetland, Kerguelen, and on the coasts of South America and Africa. They are decreasing in number in northern seas and the catches there made have been light in recent years.

Consul General Bartleman reports that in the Falkland Islands and their dependencies more than 8,000 whales were taken last season. Factories at South Georgia reported 5,000, and plants in the Falklands, South Shetlands, South Orkneys, Graham Land, and South Sandwich Group accounted for approximately 3,000. In the latter places there are about a dozen whaling companies, while in South Georgia alone there are seven such enterprises which employ over 1,000 men during the season. The 50 whalers owned by these companies are equipped with the most modern implements for catching, towing, and manipulating whales, and the large steam floating factories are fitted up with improved machinery and ingenious apparatus for extracting oil.

The January number of the *Revista Zootécnica,* Buenos Aires, contains an article on whaling which shows the numerous uses created for whale oil and other whale products that have led to a very profitable development of the whaling industry; notwithstanding the constantly increasing quantity of oil and whalebone, prices continue to rise. A Norwegian whaling company, operating in the Antarctic seas, recently paid dividends equal to 70 to 85 per cent. of the capital invested. The demand for whale products is so great that 75 per cent. of the catch for 1910 was sold in advance. A catch of one whale a week per vessel is considered very satisfactory.

The industry is of growing importance in Chile. The Corral Whaling Co., with headquarters at Corral, gives employment to 200 men. Two hundred whales is the average annual catch, from which 10,000 barrels of oil are extracted. The largest whale so far caught by this company measured 125 feet and yielded 100 barrels of oil. (*Daily Cons. and Trade Rep., No. 136, 1912.*)

PHYSICAL GEOGRAPHY

ORIGIN OF THE CENTERS OF ACTION OF THE ATMOSPHERE. The control of our daily weather conditions by the cyclonic and anticyclonic areas which appear on our weather maps is a very familiar matter to the large majority of the people of every civilized country. Further, the general principles upon which weather forecasting from day to day depends are also very widely known to be based on the characteristics, relations and movements of these same low and high pressure areas. In view of the importance of these local pressure conditions in controlling our daily weather changes, it is surprising that the importance of the control over weather and climate exercised by the much larger, so-called permanent areas of low and high pressure, over oceans and continents ("Centers of action"), has only very recently begun to be recognized. It is now becoming more and more clear that seasonal characteristics of our weather, and great characteristics of our climates, may often be traced back to special temporary peculiarities in the development, or position, of these permanent cyclones and anti-cyclones. Hence, every advance in our knowledge of the conditions affecting the latter is an important step toward long-range forecasts, and toward a better understanding of the climates of the world.

Dr. W. J. Humphreys, of the Mount Weather Observatory, in a recent study of "The Origin of the Permanent Ocean Highs" (*Bull. Mt. Wea. Obs.,* Vol. IV, Pt. I, 1911), finds that, in addition to the dynamic control of these highs, arising from the "thrusts" of the westerly winds toward the equator and the easterly winds toward the poles, there is a thermal control which has not received attention. The latter he believes to be due to the cold ocean currents which cross the zone of the highs, lower the air temperatures and thereby produce a higher pressure. The unsymmetrical location of the permanent ocean highs, toward the eastern sides of the oceans, is believed to be essentially due to the fact that the cold water is on that side. A maximum ocean high must, Dr. Humphreys concludes, be "at that place where the mechanical and thermal causes combine to produce the greatest result, that is, a little to the west of the intersection of the coldest portion of an ocean current with a high pressure belt." It may be added that Dr. Humphreys' emphasis on the control exercised by these cold currents gives rise to the suggestion that the conditions which determine, from year to year, stronger or weaker, colder or warmer currents, deserve careful study, if upon currents depend the ocean highs which, in their turn, control the winds and weather of distant lands.

In another paper in the same number of the *Bulletin of the Mount Weather Observatory,* on "The Aleutian and Icelandic Lows," Dr. Humphreys points out that the reason for the perpetual Icelandic low is the perpetual ice over the high regions of Greenland and Iceland, while the Aleutian low is a phenomenon of the winter only, owing to the high summer temperatures of Siberia and Alaska.

R. DeC. Ward.

THUNDERSTORMS OVER TROPICAL ISLANDS. The frequent occurrence of thunderstorms over mountainous tropical islands is the natural result of the favorable opportunity for the development of local convectional currents, reinforced by the diurnal ascending winds which depend upon the topography. In a recent discussion of this subject (*Das Wetter,* April, 1912), Dr. Kurt Wegener brings out some interesting points in connection with the thunderstorms of the islands of Savaii and Upolu, of the Samoan group. Even during the dry season (the southern hemisphere winter) thunderstorms are of almost daily occurrence. The cumulus clouds are carried from the ocean towards the mountains in the forenoon; collect over these mountains, and grow into heavy cumulo-nimbus towards evening. These immense cloud masses, usually reaching a height of six miles, serve to indicate the position of the island to approaching vessels long before the highest mountains themselves can be seen from the ocean. The clouds extend further to leeward than to windward, but the rainfall is heavier on the windward slopes. This difference in rainfall, as well as the difference in sunshine, has a very noticeable effect upon the distribution of vegetation. The thunderstorm activity is far greater in the rainy season (summer) than in the dry season, when the trades blow.

Dr. Wegener's observations lead him to the view that the lightning in tropical thunderstorms is just as severe and strikes just as often as it does in extratropical thunderstorms, although the prevailing opinion is to the contrary. From a series of observations collected in the Samoan Islands it appears that lightning strikes there even oftener than it does in Germany. One cocoanut palm out of 200 is struck annually on Upolu and on Savaii. The inhabitants of the tropics live so often in the midst of tropical forests, or in plantations of cocoanut, cacao, rubber, and other trees, that the damage done to the tree tops attracts comparatively little attention. Moreover, in damp, tropical climates the trees, with the exception of the cocoanut palm, suffer comparatively little damage. The cocoanut palm, whose trunk is very dry, is frequently broken off just below the crown.

R. DeC. Ward.

Low Temperatures and Vegetation. Two recent papers by Forrest Shreve, of the Desert Botanical Laboratory of the Carnegie Institution, at Tucson, Ariz., deal with inversions of temperature, and with the duration of cold, and their effects upon the distribution of vegetation in the vicinity of the Laboratory. In "Cold Air Drainage" (*The Plant World,* XV, May, 1912, 110-11) the results of observations of minimum temperatures made from April to October, at altitudes of 4,000, 6,000 and 7,000 feet in the Santa Catalina Mountains, as well as of other related observations, are discussed. The general facts of temperature inversions are similar to those which have been determined for other localities, but they are very striking in this region of great aridity and of much clear sky. The "abrupt change of temperature at a particular level" was noticed when the observer returned to the bottom of the cañon after making the readings on the slopes, and this "level became higher as the evening advanced." In fact, "the floor of the cañon was filled with a veritable stream of cooled air with a very definite surface." The importance of this nocturnal distribution of temperature for vegetation is obvious. For example, in the locality under discussion, the minimum temperatures found on one of the ridges at 7,000 feet are found at only 4,650 feet in the cañon. The author has noted that a number of desert species range to a much higher altitude on ridges and the upper slopes of cañons than they do in the cañon bottoms and on the lower slopes. In the second paper, "The Influence of Low Temperatures on the Distribution of the Giant Cactus," the author discusses the relations which he has discovered between the duration of cold and the distribution of *Carnegia gigantea* (*Cereus giganteus*). It appears that the maximum number of consecutive hours of freezing is the most important climatic element in determining the northward range of this plant. The giant cactus is capable of withstanding nineteen hours of continued freezing temperatures, and a minimum as low as 17° Fahr., as shown by the temperature records at Yuma, Phœnix, Tucson and Flagstaff. An experimental study with a number of young potted giant cacti exposed to freezing temperatures (in freezers) confirmed these results. The plants which were exposed to from twenty-nine to forty-six hours of freezing were unable to withstand the cold, while those exposed for from six to fifteen hours survived. All this shows how important are detailed observations of temperature at different altitudes in studies of plant distribution. R. DeC. Ward.

Notes on North Atlantic Currents as deduced from the course of derelicts. In a recent contribution to the *Bulletin* de la Société de Géographie de Lyon (Vol. IV, Fasc. 1, 1911, p. 68) Mr. Hautreux deduces some interesting conclusions relating to the North Atlantic currents, based on a study of the course of derelicts as shown by the Pilot Charts of the U. S. Hydrographic Office. The writer says that the data obtained from the drift of derelicts are likely to throw more light on the movement of ocean currents than those gathered by means of sealed bottles. This is because the former are less subject to the influence of winds and extend deeper below the surface of the sea; also because passing steamers carefully note their position so that their itinerary can be plotted, while, on the other hand, only the original and final positions of drifting bottles are known. It appears from these notes that the currents known as the Canary Islands Current, the North Equatorial Current, and the Gulf Stream form a closed barrier around what is known as the Sargasso Sea. The Gulf Stream itself, after leaving Cape Hatteras, does not extend in a north-easterly direction towards Europe, as usually shown on maps, but takes instead an easterly course and heads for the Azores. After these islands are attained the current becomes affected by northerly winds and is deflected towards the south-east and the south. The warm currents along the Irish and Norwegian coasts are due to the prevalence of westerly or southwesterly winds and the consequent easterly set of the surface waters of the North Atlantic.

The course of derelicts reveals a current counter to the Gulf Stream. This hitherto unmapped body of water passes between Bermuda and the Bahamas, traveling in a southwesterly direction at a speed of from four to ten miles in twenty-four hours. The course and speed of these currents are exceedingly complex and wholly devoid of uniformity. Gusts of wind, and squalls cause them to deviate considerably from their normal course, sometimes bringing about stops or even retrogressions in direction. It also appears that the speed of these currents is largely in excess of that deduced from a study of the drift of sealed bottles. In the center of the North Atlantic, the drift of derelicts tends to show that their speed is four or five times greater than the rate of floating objects much smaller in size. The speed also varies according to the season of the year. Around the Sargasso Sea, it attains its maximum in summer and its minimum in winter. In the Gulf Stream it varies between ten and thirty miles a day with an average of eighteen miles. The North Equatorial Current travels at a speed of ten miles in winter and twenty in summer. It thus appears that the maximum speed is attained about the time the trade winds begin to shift towards the north. Leon Dominian.

PERSONAL

Captain Amundsen. On returning to Europe in September, Capt. Amundsen will make his first address before the Norwegian Geographical Society in Christiania. A few days later he will lecture before the Berlin Geographical Society and later in other cities in Germany, Austria and Switzerland. He will address the Royal Geographical Society in London on Nov. 18.

On April 16, the Storthing of Norway unanimously voted a grant of 136,365 kroner (about $36,818) to Captain Amundsen's North Polar Expedition.

F. V. EMERSON. Prof. F. V. Emerson of the University of Missouri is at work this season for the U. S. Soil Survey in the Ozarks of Missouri.

A. G. MADDREN. A. G. Maddren, of the Alaska Division of the U. S. Geological Survey, left Washington the last week in April bound for Seattle. He is on his way to the Upper Porcupine River, for the purpose of completing, during the coming summer, a geologic examination of the international boundary from the Porcupine to the Arctic coast.

J. B. TYRRELL. J. B. Tyrrell, of Toronto, is to head the Ontario Government Expedition to locate the five-mile strip on Hudson Bay which the province is to receive from the Dominion. His party, consisting of one or two surveyors and a half-dozen Indians, will probably proceed to Winnipeg the last of May, and thence by Lake Winnipeg to Port Nelson. A large part of five months will be spent along Hudson Bay. Mr. Tyrrell has personal knowledge of the Hudson Bay district, which will make his services of especial value. (*Economic Geology,* Vol. 7, 1912, p. 311.)

GENERAL

RECENT CENSUS RESULTS. The population of Servia, according to the census of Dec. 31, 1910, is 2,911,701, an increase of 8 per cent. since the census of 1905. The largest cities are Belgrade (89,876 inhabitants) and Nisch (24,949).

The population of the Commonwealth of Australia, according to the census of April 3, 1911, was 4,474,944, of whom 72,282 were colored or mixed breeds. The increase since the census of 1901 was 17.32 per cent. The distribution of the population was: New South Wales, 1,648,746; Victoria, 1,315,747; Queensland, 614,500; South Australia, 409,997; Western Australia, 288,483; Tasmania, 191,214; North Territory, 4,533.

The population of Algeria, according to the census of March 5, 1911, was 5,563,828, of whom 795,522 were Europeans. The increase since the census of 1906 was 7.9 per cent.

RESEARCH DEPARTMENT OF THE ROYAL GEOGRAPHICAL SOCIETY. The afternoon meetings that have been held for the discussion of research topics will no longer be regarded as departmental meetings but as meetings of the Society as a whole. In other words, this activity has been very successful and it has been decided to include it in the general work of the Society. *Nature* (May 30, 1912) says that at the last meeting of the Department, on May 23, the Chairman, Prof. Myres, pointed out that the important branches of study that had come under the purview of this section of the Society included new methods of surveying, problems of geomorphology (especially those effecting rivers and coasts), of hydrography and climatology, various regional and synthetical studies and investigations from the point of view of distribution, physical changes within historical times, and the exploration or investigation of particular territories with special regard to conditions affecting their settlement and economic development.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

AMERICA

Annals of the Association of American Geographers. Vol. I, 1911. Maps, ills., index. Published by the Association. $3 unbound; $3.50 bound. Richard E. Dodge, Editor, Washington, Conn. 10½ x 7½.

The first volume of the *Annals of the Association of American Geographers* appeared this spring with date 1911, the year of the Pittsburg meeting (Dec. 1910, Jan. 1911). Though introduced by Cowles's interesting Presidential address on the causes of vegetational cycles, the main feature of the issue is W. M. Davis's "Colorado Front Range," the newest and most elaborate of the studies in physiographic presentation that have almost wholly occupied Professor Davis of late years. It is also the clearest and most convincing, unless the present writer is biased unduly by having been on the ground with the author at the time of these studies.

It is undoubtedly the best account of the region, a result to which Professor Davis's quite unique sketches contribute very much. Professor Davis would make all geographers his debtors if he could expound the method of his sketching. An item of much interest is the generously recognized work of A. F. Marvine, done nearly half a century ago. Briefer papers are Brooks's "Alaska Coal," adequate to supply the whole Pacific coast for a long period, but for "our unfortunate public land policy"; Atwood's "Mesa Verde," Fassig's "Climate of Porto Rico" and C. A. Davis's "Salt Marshes.' The last fifty pages consist of titles and abstracts of papers presented to the Association from 1904 to 1910, a valuable list, and it would have been still more so had the editor given in more cases the reference to the place of publication of papers.

The publication is in excellent form (7¾ by 10½ inches), well printed on good paper with wide margins. It is an admirable volume and invites wide attention to the future publications of the Association. Mark Jefferson.

In Northern Labrador. By William B. Cabot. xii and 292 pp. Maps, ills., appendix. Richard G. Badger, Boston, 1912. $2.50. 9 x 6.

This book is the record of several summer trips to northern Labrador, mostly along the Assiwaban River. The bleak glaciated topography, the hot summer days with their hordes of mosquitoes, the northern Indian and the Eskimo are made real by the author's descriptions.

Mr. Cabot could speak the local dialects. His admiration and good will are for the Eskimo rather than the Indian. The former he regards as industrious, peaceable and trustworthy in contrast to the Indian. Here especially the customs are mainly an outgrowth of the environment. "Death comes from the northeast" is the description of the raw, damp northeast winds. A green branch hung on a pole gives the time when the last travelers passed; the length of time is inferred by the withering of the foliage.

It is fortunate that the author's knowledge of geology enables him to convey to his reader a correct idea of the bare, smoothed surfaces, erratics and the glacial lakes and streams. The statement (page 3) that "six thousand years may well cover the time since the ice departed" is bold indeed; professional geologists, as far as the reviewer's knowledge goes, have not been able to estimate post-glacial time so closely. The drowned coast with the "runs" behind the submerged islands gives easy sailing and fishing and leaves a line of trading stations along the inner coast. The author's description of the lower Assiwaban gorge with falls in the lower part, hanging valleys and well-defined terraces makes the geological reader desire to visit the locality. The illustrations add to the value of this readable book. F. V. EMERSON.

The Aborigines of Minnesota. A Report based on the Collections of Jacob V. Brower, and on the Field Surveys and Notes of Alfred J. Hill and Theodore H. Lewis. Collated, Augmented and Described by N. H. Winchell. xiv and 761 pp. Maps, ills., index. The Minnesota Historical Society, St. Paul, Minn., 1911. 12½ x 9½.

This volume is crowded with a stunning amount of detail. It is hard to conceive that anything now remains to discover in connection with the story of the Indians in Minnesota. Yet there has been one great lack, an editor. It appears that this work was cumulative. It began with the collection of data by Alfred J. Hill. In this he availed himself of the field work of Theodore H. Lewis. Their work next devolved upon Jacob Vradenburg Brower. Last of all the accumulation fell into the hands of Prof. N. H. Winchell. The record is not inaptly, though somewhat with over-estimation, set forth by Prof. Winchell: "Mr. Hill plowed the field where Mr. Lewis sowed the seed, the fruit of which Mr. Brower garnered; it is simply the putting of this fruit into the current markets of archæology which has fallen to the writer." And to the lack of an editor must be added the lack of such an exhaustive index as should render this storehouse of facts available for use.

It is possible to dip into these pages almost at random and emerge with something worth knowing, but there is nothing to direct the search. We would not seem to discredit the Minnesota Historical Association. It has produced a monumental work at great expense. It is a credit to an unendowed society. The work is done with great and quite successful striving after mechanical accuracy. The best that can be expected of the work is that it shall be a storehouse for all time to come from which future students shall draw their material for topical monographs. WILLIAM CHURCHILL.

British North America, 1763-1867. By A. Wyatt Tilby. Vol. III: The English People Overseas. vii and 441 pp. Constable & Co., Ltd., London, 1911. 6s. 8 x 6.

This is Vol. III of a series and bears the special title, British North America. It includes three of the so-called books of the series, IX, X, and XI. Book IX bears the rather unhappy title, "The Split of Empire," and traces the story of Canadian affairs from 1763 to 1801. Its chapters relate to the peace of 1763, the constitutional struggle of 1764-1774, the Imperial Civil War, or the American Revolution, the United States of America, and the constitution of Canada. These early chapters, as well as most of what follows, are distinctly historical rather than geographical, and deal much more with political deeds and motives than with the land and man's relation to it. On page 106 is a passage fully recognizing the modifying agency of physical features. Referring to the United States as still containing a part of the English people, it is observed that a change of government may modify the conditions of development, but will probably influence a people "less than the constant operation through several generations of a different climate and a fresh environment."

Book X rehearses the "Call of the West." Here, in the account of the Northwest Passage, of the Hudson's Bay Company, and of the overland movement to the west, the geographer finds himself more at home. To many who look upon the Hudson's Bay Company as the great corporate pioneer of Canada, it is surprising to be told that during the first century of the life of this company it added nothing to geographical knowledge, but, in the alliterative phrase of the author, "concentrated its attention on skins and not on science, on dividends and not on discovery." The call of the west includes that of the north as well, and ten pages are filled with Mackenzie's adventures along his great river. Book XI, "The Birth of the Canadian Nation," is again purely historical and is a short story of the steps that led up to the Union of 1867.

The work is rather discursive in character and shows a certain lack of unity and coherent structure, though it is doubtless more effective as one of a series than as a single volume. A. P. BRIGHAM.

The Greatest Street in the World. The Story of Broadway Old and New, from the Bowling Green to Albany. By Stephen Jenkins. xxii and 509 pp. Maps, ills., index. G. P. Putnam's Sons, New York, 1911. 9 x 6.

The chapters deal in sequence with the Fort and Bowling Green, Broadway to Wall Street, Wall Street to the Commons, the Commons, City Hall Park, from the Park to Canal Street and so on to the concluding pages which tell of Broadway in Columbia and Rensselaer counties. The story tells of the growth and development of the great street. The author has collected a great mass of valuable material, much of it relating to incidents of national importance. The promenade list ranges from the first man who walked down Broadway with a waxed mustache to historical pageants and funerals. The many-sided aspects of such a street touch upon nearly every phase of human activity and the book contains no end of variety. It is rich in historical allusions, and apparently every drama of importance enacted along this highway is here recorded. The illustrations include many from old prints, and many photographs of the present day. ROBERT M. BROWN.

Beiträge zur Charakteristik der älteren Geschichtsschreiber über Spanisch-Amerika. Eine biographisch-bibliographische Skizze. Von Friedrich Weber. Beiträge zur Kultur- und Universalgeschichte: No. 14. xi and 338 pp. Index. R. Voigtländers Verlag, Leipzig, 1911. Mk. 10. 9 x 6.

In the complex of territories of diverse settlement which we have united into a nation no inconsiderable area comes to us through Spanish sources. In much of our southern country, in all of our southwest, our title runs back to Spanish deeds. It is, therefore, with no little surprise that we note in this volume the complete absence of discussion of the history of California. The inner southwest, under the title of New Mexico, is dismissed in seven pages; and the Atlantic southeast is summed in six pages given to Florida. It will thus be seen that this volume has little of interest for the historical geographers of the United States. There is an equal failure to deal with the Spanish America south of the Amazon except as the Inca culture on the west coast has attracted the author. With these reductions the work is seen to deal most conspicuously with Mexico and the smaller republics immediately south thereof. In this narrower scope the study is valuable. It is practically a bibliography expanded with biographical detail, and at times critical comment is added. As such it will be found to serve an excellent end as introductory to the study of the historians of Mexican culture. Within the limits of this narrower field the author has been sedulous in collecting the material, some of it by no means generally familiar, and no conspicuous omissions have been discovered. It fills quite satisfactorily an important place as a compendium for Americanists which will spare the student much necessity for research of obscure documents.

WILLIAM CHURCHILL.

AFRICA

La Colonisation Française dans l'Afrique du Nord. Algérie-Tunisie-Maroc. Par Victor Piquet. viii and 538 pp. Maps. Armand Colin, Paris, 1912. Fr. 6. 8 x 5.

With this volume the author has brought to a brilliant conclusion his history of northern Africa. The first volume was published three years earlier and discussed the non-Christian civilizations of the Barbary States as in succession or by delimitation the Berbers, the Arabs and the Turks succeeded in establishing themselves. This was an essential preliminary in Piquet's historical scheme; his end is to present the history of France on the southern shore of the Mediterranean, and it was necessary to set forth the preceding state of barbarism. The second volume, published in 1910 and reissued in a second edition this year, deals with the period of military occupation of the High Barbary by France between 1830 and

1910. In this final volume, which is sufficiently complete to stand by itself, the author recapitulates his former studies in brief as the proper background upon which to draw his really excellent picture of the present state of the great French colony in Tunisia, Algeria and Morocco. While the author is strongly national and earnest in his belief that these southern shores of the Mediterranean properly belong to his country he has left the diplomatic history almost wholly out of this record. But to those who seek a full story of the civic and social progress of this colonial successor of the Saracen empire this history will be found invaluable.

WILLIAM CHURCHILL.

Specimens of Bushman Folklore. Collected by the late W. H. I. Bleek and L. C. Lloyd; edited by the latter. With an Introduction by George McCall Theal. xl and 468 pp. Ills., appendix. George Allen & Co., Ltd., London, 1911. $6.50. 9 x 6.

In these days when any one with a liking for the Marquis of Carabas and Aladdin may apologize for the soundness of his literary taste by calling it interest in folklore we cannot praise too highly the rugged honesty of the material which this volume offers. Folklore is something far more valuable than the mere telling of tales of old wives in the sun. Such tales give us our surest access to the minds of primitive folk, and without this knowledge of the mind and soul of the elemental folk of our kind we are to be forever barred from the truths of social evolution. The collector of such material must put aside all thought of translation into smooth English, transliteration of the thought must be the aim of the conscientious student. Sentences may be sententious till they snap like a whiplash, continuity of the flow of thought may seem lacking, connectives absent; yet these are the very details upon which the careful student is to base his knowledge of the thought method of those to whom the stories are literature.

That is the most salient characteristic of the stories collected in this volume. They have been dealt with honestly, they may be used for more advanced study with whole confidence that they have not been distorted in the record and the rendering. Nor is this all. The senior author, Dr. Bleek, had already won fame by his comparative studies of the Bantu and the Hottentot. The world was awaiting in high expectation a great work of his pen on these tongues. But the poor unknown Bushmen came within his reach, he put aside the enticing prospect, plunged into the hard labor of Bushman studies. This volume is the result, the one authoritative record of this pygmy people whom some regard as the persistent survival of palæolithic man. The sacrifice he made was great. This volume should have been his reward; it stands as his monument. W. C.

Tripolitania e Cirenaica dal Mediterraneo al Sahara. Monografia Storico-Geografica. By Arcangelo Ghisleri. 198 pp. Maps, ills. Società Editoriale Italiana Istituto Italiano d'Arti Grafiche, Milano-Bergamo, 1912. 10½ x 8.

This is an excellent monograph which, though elementary in scope, covers the salient facts of our knowledge of the region. A short historical sketch precedes the geographical notes that comprise the main part of the work. The reader is enabled to determine the relative importance of Tripoli from the days of roving Phœnicians, five centuries B. C. at least, to the present military operations of the Italians. The author evidently took particular pains to mention the work of modern explorers, although not in the form of a continuous record. These notes, in fact, are dispersed throughout the text.

In the second and third parts, the general geography of Tripolitania is reviewed. The description is accompanied by anthropogeographic notes of value. The coastal region is treated with much detail. The author says that no mountain chain properly so called exists in the former vilayet of Tripoli and that the mountains which were supposed to extend from east to west across this territory were only a series of sand dunes which explorers proceeding from north to south had erroneously regarded as the foothills of a southern chain. The book ends with a description of the deserts and oases of the hinterland. A list of the main caravan routes is appended. Some good maps and many photo-engravings illustrate the book.

LEON DOMINIAN.

About Algeria, Algiers, Tlemçen, Constantine, Biskra, Timgad. By Charles Thomas-Stanford. 302 pp. Map, ills., index. John Lane Co., New York, 1912. $1.50. 7½ x 5½.

The author is a wide-awake traveler who made a rapid trip through these parts of North Africa in a motor-car. He gleaned many things of interest to anyone who contemplates a similar visit. Many picturesque glimpses of Algeria are presented in a rather rambling and original style of writing. The chapters on the "Alluring Oasis" and the "Sahara" are the best. The former is inspired chiefly by Biskra, which the author christens "Hichenstown," and the latter by the vastness of the waste which makes up over ninety per cent. of Algeria. In Timgad of the desert, a city destroyed some twelve centuries ago, interesting and impressive structures have been unearthed, and among these is a Roman library "bequeathed by Marcus Julius Quintianus Flavus Rogatianus, of senatorial memory," whom the author dubs a "Roman Carnegie." Throughout the narrative stories of invasions, historical incidents and descriptions of peoples and customs are interspersed. ROBERT M. BROWN.

Man and Beast in Eastern Ethiopia. From Observations made in British East Africa, Uganda, and the Sudan. By J. Bland-Sutton. xii and 419 pp. Ills., index. The Macmillan Co., New York, 1911. $4. 9 x 6.

This readable book is a running comment upon travels in British East Africa, Uganda, and the Sudan. All travelers have a bias for one thing or another, and Mr. Bland-Sutton has devoted a large portion of his book to animals, especially birds. These descriptions are in no sense technical but are what would be expected from an observant traveler who is especially interested in animal life. The descriptions of the various tribes encountered in the travels are interesting. Their habits, food, social customs and other features are described as the author saw them.

Two chapters have especial interest for students of earth science. One chapter deals with the great Rift Valley of Africa. This trench, a relatively narrow downthrow fault block, has sides so steep that "the traveler may suddenly come to the edge * * * and run a risk of tumbling over." The sunken block is itself broken, giving a series of fault escarpments on the valley floor. Chapters are given to the interesting extinct volcanoes of the region of which a few are described. The scarcity of helpful maps is somewhat annoying. F. V. EMERSON.

ASIA

La Géologie et les Richesses Minérales de l'Asie. Historique—Industrie—Production—Avenir—Métallogénie. Par L. de Launay. 816 pp. Maps, index. Ch. Béranger, Paris, 1911. Fr. 35. 9½ x 6½.

In order properly to judge this book one ought to know the earlier work of the same author on the Mineral Wealth of Africa of which this is a continuation. The author's purpose is to establish a connection between the geological structure of the Asiatic continent and the occurrences of minerals, and he designates this special line of work by the term "metallogenics." This name does not appear adequate, and it is not easy to understand why the seemingly more appropriate name of mineralogenics was not chosen; for it is the genesis of minerals in general, not of metals alone, which the author investigates. Therefore, the words metalliferous, metalogenic, etc., must in most places be understood as mineral-bearing, or mineral-forming, etc.

The author tries to throw light on isolated local mineral occurrences by means of general ideas founded on the synthetic study of large areas. He wishes to determine the relation between the mineral-bearing strata of a country and the whole of its tectonics, and again the relation of the latter to certain geological processes, the ages of which must be ascertained as accurately as possible. In this way the "metalliferous" strata are studied, as it were, in their environment, and Asia is an especially favorable object for such studies for two reasons: first, because it shows very clearly the contrast between the metals formed at great depths by geological pressure, and the more superficial incrustations in fissures; secondly, because it illustrates to perfection the effects of the continental extent of those processes. In this way the author finds it possible to establish "metalliferous" provinces and to describe their regional aspects and determine their relations with certain geological phenomena. The age of the later being known in most cases, that of the minerals, too, may be determined with tolerable accuracy.

The first part contains the economic and industrial facts; it describes the past, present, and future, of mining industries in Asia. The second part is given over to "metallogenics," *e. g.* "the genesis of useful minerals" (p. 4). It consists of a general and a special part: the former is mainly geological, including a geological history of Asia, a division of Asia into great natural "provinces" with individual conditions of folding, dislocations, igneous intrusions, metamorphism, and erosion, as well as sedimentation. The latter part is subdivided into two parts again, corresponding to the fundamental difference in "metallogenic" processes: igneous or hydrothermal processes, which account for almost all the metal-bearing strata, and sedimentary action, which produces salt, etc.

The *leitmotiv* of the book is to show that the "metalliferous" strata of one and the same "province" exhibit common characteristics, owing especially to the medium depth at which crystallization took place, and how these conditions have a tendency to repeat themselves in other provinces of similar nature. Four types of such "metallogenic" provinces are distinguished:

1. The first type may be explained by imagining a zone of rock crystallized at from ten to thirty kilometers below the surface. The product would be some kind of granitic rock surrounded by metamorphic gneisses. This type will be exposed to view wherever the land is worn down low enough, and its best examples in Asia are the Angara Plateau in Siberia, Gondwana area in India, the Sinian bathylith in Korea-Pechili, etc. In these "provinces" are found two types of "metallization," both characteristic for great depths: igneous impregnations, which elsewhere appear in large masses, appear here interstratified as very small veins among the layers of schistose rocks, and they are accompanied by gold, copper, and nickel.

2. At a somewhat higher level within the earth's crust there is an abundance of granulites (the author gives no definition of what he understands by that much discussed name), fine-grained granulites, and micro-granulites which higher up pass into diabases, porphyrites, etc. These three groups have a tendency to form dikes and veins rather than homogeneous masses, and are especially well formed in the so-called Hercynian chains of which the Ural and Altai Ranges, Indo-China, and Malacca are the best Asiatic examples. The massive granulites contain tin as a rule, the fine-grained ones; antimony, the micro-granulites; lead, zinc, copper.

3. Still higher in the crust is the region of the third "province." It lies probably at the base of the recently folded chains, and is a zone rich in dislocations which are not necessarily connected with the folding processes, but have occasionally broken the already existing folds. Along the fault-lines, eruptions of andesites and trachytes have taken place. These provinces are rich in minerals: gold, silver, copper, quartz, especially in North America. In Asia the Colorado type is repeated in Japan, and partly also in Armenia and the Anti-Caucasus.

4. The fourth "province" corresponds to the folded chains proper, in which tectonic forces play only a subordinate part. They are characterized by the almost complete absence of minerals, such as the Jura Mts. in France, and the northeastern Caucasus and certain parts of the Himalayas represent it in Asia.

No important mineral deposit has been produced by an active volcano. Wherever minerals are found in zones of recent volcanic activity, they date from an earlier period. The "metalliferous" zones always have their origin at the greater depths, and in many cases the age of a chain is not that of the formation of the minerals it contains, because it is not the process of folding but that of dislocation which produced the latter. The book is profusely illustrated with maps and diagrams, and two indices, one each of subjects and of geographical names, greatly facilitate its use. M. K. Genthe.

Le Peuple Japonais. Le Vieux Japon—Le Japon Moderne—Le Japon Actuel. Par Jules Arnoux. 510 pp. Marcel Rivière et Cie, Paris, 1912. Fr. 5. 7½ x 5.

The theme here is the change which Japan has been undergoing, but the author does not regard it as a distinctively modern phenomenon associated with enforced contact with the Occident. He finds it in progress in far more remote periods, in distant ages he finds Japanese impermanence in striking contrast with the age-long immobility of China and of Asia in general. In explication of his theme he cites the saying of the Japanese immediately after the late war: "When we were artists and philosophers you treated us as savages; we had to win the battle of Mukden and slay a hundred thousand Russians to show the world that we are civilized." It is a bitter arraignment, part specious, part real. Elsewhere he quotes the speech of a young Chinese at the Congress of Lucerne in 1906:

"We were a peaceful people, what have you made of us? Not only do you force us to defend ourselves, you are making us as savage as yourselves."

Such an attitude can lead to no good results in the history of race development, for the sting of epigram lies in the impossibility of confuting its half truths. The study of modern Japan is to be conducted with full recognition of the new burdens which it has assumed, of the new relations upon which it has entered. There cannot be adduced, in this work there is not adduced, any evidence that any contest for the hegemony of Asia is predestined to engage China and Japan in a monster struggle; still less is there evidence that Japan will advance to imperial aggrandizement upon the Pacific at the expense of Europe and the United States. We no longer have to deal with the Japan of the tea gardens and the cherry blossom festivals, but on the other hand, we see no reason to regard with suspicion a small and experimental nation. The author seems far too alarmist. WILLIAM CHURCHILL.

Ruins of Desert Cathay. Personal Narrative of Explorations in Central Asia and Westernmost China. By M. Aurel Stein. Vol. I, xxxviii and 546 pp. Vol. 2, xxi and 517 pp. Maps,* ills. Macmillan & Co., Ltd., London, 1912. $12.50 for 2 vols. 9½ x 7, each.

The two portly volumes of this record of exploration in the deserts of inner Asia are so crowded with material that a synoptical syllabus may be found of value. First we delimit the geography covered in these years of difficult wandering. Dr. Stein, already fitted for such service by earlier familiarity with the conditions to be met with on the arid side of the Himalayas and with a close examination of Khotan to his credit, left India by the northwest gate through the Swat valley and reached Kashgar by way of the Afghan Wakhan. Thence bending his way eastward, he threaded the Lop-nor with excursions into the desert of Gobi, passed through the New Dominion of Chinese Turkestan, reached An-hsi and the Great Wall and entered the Chinese Empire from the west, made a reconnaissance of the mountain chains of Nan-Shan, and re-entered India by way of Ladakh.

Not till the very end of these brilliant journeys did the glaciers of the Nan-Shan exact the toll of frozen toes which must be paid by those who would conquer the realms of everlasting ice. He had able assistance of that wonderful corps of Indians who have become well-trained geographers in the trigonometrical survey, whose headquarters are at Dehra-Dun, but whose pundits in all sorts of disguises have threaded the recesses of Central Asia. The record of the exploration is, therefore, supported by a series of excellent maps in which theodolite and plane table have carried the determination of position sheer across the greatest width of India.

The contribution to physical geography is two-fold, mountain and desert. In the former Dr. Stein is at his best. We are made to feel that mountain climbing is to him a joy, his description of alp and glacier is precise and enthusiastic. All the more is our pity that the ice nipped him before letting him go. In the desert, in Lop-nor and Gobi, in the struggling oases, he has given sedulous attention to the problems of desiccation, of æolian formation and the deposit of the loess.

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* Copies of these maps listed under "Central Asia" in *Bull.*, Vol. 43, 1911, p. 392.

With general ethnology his narrative deals very slightly, yet here and there we find hints that he was careful to collect anthropometrical data for examination by other students who might handle the material which he has brought out of the unknown. His archæological examination, however, has been as thorough as extensive. He has discovered many seats of culture buried under the dunes which have overwhelmed the former civilization of that region and in many cases has succeeded in establishing at least one and sometimes both limiting dates. He has surveyed the outer lines of the Chinese Empire, laying bare the desert wall and its watch towers by which China fought back those wild tribes who thence were driven to harry the western world as the fierce Huns under the leadership of Attila, God's Scourge. He has identified the great overland trail along which the slow camel trains carried silk to deck the pomp of imperial Rome; at one of its stations he found a bolt of yellow silk which had been left behind when saddling up. We can imagine the lash or worse which was the reward of the careless camel driver close on 2,000 years ago.

His contributions to philology surpass all measure of value. He has unearthed inscribed billets of wood with carefully stated dates, some of them going back before the Christian era. The sands of that rainless region have preserved for his mattock invaluable scraps of paper, of palm leaves brought from afar, of shavings, each carrying some legend. These finds would be enough to bring him fame, but more has come. At Tun-Huang, in the shrines of the Thousand Buddhas, he collated a temple library, in barbarian measure "seven cartloads," and of these cartloads he has succeeded in bringing back to the British Museum 14,000 manuscripts which will engage special students for yet many a year of enthusiastic research. Included in this find are sacred texts in ancient Chinese, in Tibetan, in Kharoshthi, in Indian Brahmi, in Gupta. In Sanskrit he brought back the most ancient manuscript known. He discovered a complete religious treatise in the "southern unknown language," of which his earlier researches in Khotan had revealed a few fragments, and in this later discovery he has given science the bilingual with which that unknown speech can be studied and established. Another of his finds yields us the first authentic text of the great "confession" of the Manichæans, that religion of western Asia which blocked so long the movement of Christianity eastward until at last the two warring faiths were whelmed in the advance of the tide of Mohammedanism.

This is but the briefest synopsis of the more salient matters which engage and hold the attention in this monumental work. After this there is little space left for review, for critical comment further than is suggested by the note of the great discoveries. It is a major work of learning. The true review of such work can come only after years when the special students have adjusted this wealth of material each within the scope of his own study. Then it will surely appear that this work of Mark Aurel Stein is fundamental in the disquisitions of half a dozen sciences. WILLIAM CHURCHILL.

Half a Century in China. Recollections and Observations. By the Venerable Arthur Evans Moule. xii and 337 pp. Map, ills., index. Hodder & Stoughton, London, 1911. George H. Doran, New York Agents. 7s. 6d. 9 x 5½.

The author proposes to give no more than the recollections and observations of his half century of striving to open the Chinese heart. That is no mean achievement. Not to all men is given the sight which must underlie observation, and very few are those who can recall the things which are worth the memory. But in these simple pages we may see in the writer a sweet nature which gave itself in sympathy to the alien and ancient culture which he sought to serve, and by a divine compensation for his gift of himself, received sympathy in return. What it was given to Archdeacon Moule to see after he had won the confidence of the people has filled him with respect and admiration, even with a full measure of affection for the Chinese character. There is little in these papers which will advance the geographer's knowledge of mid-China; still the author gives pictures of Ningpo and the countryside which are likely to prove as valuable as they are agreeably drawn. With sober anxiety he looks forward to the remaking of millennial China, but his expectation is not without hope. So long as the great conservative mass of the Chinese holds to its belief in and its practice of the fundamental virtues of education, civility and probity which have caused the empire to endure through the utmost ages, so long as this continues he foresees a great state awakening out of the sleep of the weakened dynasty. WILLIAM CHURCHILL.

Les Royaumes des Neiges (États Himalayens). Par Charles-Eudes Bonin. x and 306 pp. 3 maps,* ills. Armand Colin, Paris, 1911. Fr. 4. 7½ x 5.

The work is introduced by a note wherein pardonable pride somewhat exaggerates the absence of record of the Himalayan kingdoms and their people. It will at once be recalled that this was the region wherein Sven Hedin prosecuted arduous research to brilliant success; and for many years the sedulously anonymous pundits of the Indian survey have penetrated to the most remote valleys within the snows. Therefore it is not exactly true to say that this work fills a lacuna in geographical knowledge. The author covers the whole mountain tract from Afghanistan to the boundary line between China and Tibet in such a comprehensive survey as must be the result of his fifteen years of exploration. Yet after the correction of this misstatement there remains to Bonin's credit sufficient record of priority in the uncovering of the hidden recesses of the Lolo and the Mosso, whose territory he was the first to cross in connection with a mission which carried him to their capital of Likiang-fu or Sdam, Chinese and Tibetan designations respectively. After careful consideration of the people as they passed under his examination and from extended study of fragments of their literary product he determines their assignment to Tibetan stock and authorizes their removal from affiliation with the Chinese to which on earlier and imperfect information they were assigned. It must be said that in parts the work is trivial, yet it is throughout interesting and a most attractive narrative of a region of the world which was long believed to be the cradle of the most important branch of the human family. His chapters on Bhutan and Assam are replete with interest, a valuable compend of information by no means easy of access elsewhere and all animated by the zest of his own familiarity with the region. WILLIAM CHURCHILL.

The Economic Transition in India. By Sir Theodore Morison. 251 pp. Index. John Murray, London, 1911. 5s. 8 x 5½.

This work is happily free from the vice which characterizes many similar studies, the looseness of articulation arising from presentation of a series of lectures in academic courses. With abundance of administrative experience behind him, Sir Theodore in his earlier book took rank as an economic authority. Thus he has acquired the sureness of touch which can be found only with those who have found themselves masters of their subjects. In this study, he does not put footnote clogs upon the march of his theme; it is always fair to assume that the beginner must take his author upon faith, and the more advanced investigator will already have collated the pertinent material. It results, then, that we have in this study of India in transformation a remarkably valuable work in the most simple presentation.

The basic idea of this research is to present the fact that in India, now seething in economic unrest, the problems are not Hindi or Mahratta, not Rajput or Bengali, but universal in their strike. To the perplexed administrator there is offered nothing new. India suffers to-day under the same problems as Europe suffered in the slow course of emergence out of the middle ages. The gist of it is that archaic culture is based upon the village community, self-supporting and self-centered, an economic unit. Modern culture is diffuse, it draws from all and distributes that which it draws, its economy is no longer parochial, it is scarcely dammed at state and imperial boundary lines. The author wisely sets forth that means of transportation is the key of the transition. The map of mediæval Europe shows at a glance that civilization followed the great Roman roads. We should see that the problem of to-day in India must be the problem of to-morrow in our East, the Philippine province. In its transition from village culture to the wider place which we must force upon it, it might be well for our untrained administrators to study this valuable treatise. WILLIAM CHURCHILL.

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* Copies of two listed under "Tibet" in *Bull.*, Vol. 43, 1911, p. 879; the third under "Tibet-Burma, etc." in vol. 44, No. 5, p. 400.

AUSTRALASIA AND POLYNESIA

Murihiku and the Southern Islands. A History of the West Coast Sounds, Foveaux Strait, Stewart Island, the Snares, Bounty, Antipodes, Auckland, Campbell and Macquarie Islands from 1770 to 1829. By Robert McNab. xiii and 377 pp. Map, index. William Smith, Invercargill, N. Z., 1907. 8½ x 6.

This is a work in South New Zealand history. The author is a member of the House of Representatives and also Minister of Lands and Agriculture for New Zealand. The book marks an effort to recover an obscure early history in which the discoverers Cook, Vancouver, and Malaspina had a part. The motive under which succeeding events took place lay in trade in the seal and in flax, oil, and timber.

The search for material led to obscure documents in English and to untranslated papers in Spanish, French, and Russian. After the records of New Zealand and Australia were exhausted, search was made in the annals of Salem, Boston, New Bedford, Nantucket, Providence, Baltimore and other American ports whose whalers and sealers had plied their business in this remote region. The British Museum, Paris, Madrid, and St. Petersburg made their contribution. In the Essex Institute of Salem was unearthed the log of the *Endeavour,* the *Britannia,* and the *Providence,* of the last decade of the Eighteenth Century, made possible as a single manuscript by the fact that a Mr. Robert Murray was in succession an officer of the three ships and carried one log for all. The narrative of the region is brought down to 1829.

Murihiku is Maori for the *last joint of the tail,* and was given as a name to the south part of the South Island of New Zealand. Some of the small southern islands considered are remote, as Auckland, Campbell, Antipodes, and Bounty Islands. The general map which precedes the text is unfortunate in a degree of reduction which renders many names almost illegible. The same is true, in lesser degree, of the map of Murihiku and Stewart Island, opposite page 16.

The text includes twenty-four chapters, and five appendices. It is not intended as finished history, but brings together original material as a source for the historian. The author is perhaps too modest, however, for the story, though given in the detail of the annalist, is full of fascination for the geographer and for the general reader. The appendices include,—Cook's *Endeavour* Controversy, Menzie's Journal, Log of the *Britannia,* Log of the *Endeavour,* and Captain Kelly's Evidence. The index is full, consisting of twenty-five double-column pages, and each chapter closes with a list of references.

A. P. BRIGHAM.

Through Polynesia and Papua. Wanderings with a Camera in Southern Seas. By Frank Burnett. xv. and 197 pp. Maps, ills., appendix. Francis Griffiths, London, 1911. 12s. 6d. 9 x 6.

Islands of Enchantment. Many-Sided Melanesia. Seen Through Many Eyes, and Recorded by Florence Coombe. xxvii and 382 pp. Map, ills., index. Macmillan & Co., Ltd., London, 1911. 9 x 6.

It serves an end most satisfactory to the student to bring together into one notice two volumes utterly dissimilar, yet each covering, in the interlacing of the areas which their chords respectively subtend, much of the same little known region, much of the same life still less comprehended. A worthy book of the Western Pacific one of these is, the other wholly unworthy. If there were not a valid reason subsisting exterior to the ignorance in all things and the malice in many things which characterize Mr. Burnett's book I should be loath to mention it at all.

The external reason is this. We have very scant information as to Melanesia. It remains in that stage of knowledge in which anything which purports to give information needs proper characterization. At times it is as necessary to condemn as at others it is pleasure to commend. This surely is such a case and in this case whatever value may attach to the signature lies in the fact that the writer is a specialist upon the South Sea through his own choice and through long years of exploration and administration.

The Polynesia of Mr. Burnett is Tahiti and Rarotonga, at present the voyage of the cheap tripper in the nearer Pacific. How well he has dealt with these well-known and carefully studied islands appears in text and illustration. In his plates he presents not once or twice but several times the islanders in poses which to them are as meretricious as to our way of thought shameless. The quality of his text may be discovered in the fact that not even by accident of typography has he once spelled the name of Rarotonga correctly. The greater part of his volume, that part in which the greater interest should properly lie, engages the Solomon Islands. He opens the vials of his abuse upon the only two classes of better men who have at heart the betterment of these wild islands of savagery as yet at its fiercest, the missionary and the British administrators. He accepts with unquestioning faith the wildest statement of the traders and beachcombers. It is unsafe that such work should pass into incautious hands. It calls for a profound acquaintance with the Solomons to read it properly; yet for several of the islands this misleading book contains the first account since the days of the great voyages of exploration.

The other volume is a record of amelioration, for the author is associated with the Melanesian Mission of the Church of England with headquarters on Norfolk Island. She made a trip on the mission steamer *Southern Cross* from island to island where it was necessary to leave supplies or to visit the struggling mission stations. One may honestly hold some doubt as to the efficacy of missions among these savages; such doubt is far remote from such wholesale misinterpretation of their work as fills Mr. Burnett's pages. But it must be acknowledged that their work has produced the result already mentioned, amelioration. This is very familiar ground to me. Not quite thirty years ago a visit to most of the islands of which the enchantment holds the writer of this volume called for arms, arms in readiness and more than once in use. Yet last year a woman went from island to island and had but a pleasant trip, surely a marvelous change. Wherever she went she was well received, she made friends with the islanders, she won the shy women to the little interchanges of kindness which count for so much in savagery.

Though it covers a not inconsiderable area, from the northern New Hebrides to the central Solomons, the work is wholly unpretentious. The author does not aim to go deeply into the discovery-history or the present social condition of any one of the twenty-five islands at which she touched. On the contrary, she tells but what she saw on her landing, scarcely touches upon the experiences of the missionaries in whose party she was. It results that she has given new descriptions of all these islands, most of which have been hitherto most imperfectly described. In many cases she has supplemented her own eyesight by the always pleasing record of some characteristic tale of the island store of legend. In such cases she has drawn upon the classic work of Prebendary Codrington; the value of such draft suffers no loss by being placed in juxtaposition beside the natural scenes in which the myth arose.

With one detail we may find fault, geographically a fault to be reprehended. It will readily be understood that geographical nomenclature in Melanesia is as yet not satisfactorily established. In the imperfect longitude determinations of early voyages, the same holding true until quite recent times, synonymy has arisen; for instance, in the Solomons Ulawa is La Treguada of Mendaña, La Contrariété of Surville, Smith's Island of Lieutenant Ball. At present the attempt is making to designate the islands by their indigenous name, or, in the frequent case that they are not known by a name as islands, to employ some name which is at least in some sort of use in the vernacular and which may be extended to the island as a whole without violence to local usage. This has been carefully worked out by Prebendary Codrington, the great authority upon Melanesian speech, and while his practice has not been altogether consistent he has at least provided the material for consistency. In dealing with this very problem in a major work within this field I was sedulous to adopt the consistency which Dr. Codrington suggested even when he did not practice it. This author reverts to a still earlier usage, thus complicating the record. Two examples will serve for citation. The island which she writes of as Raga is really Arag, Codrington says ("Melanesian Languages," p. 431) "the native name is A Rag"; of her Ureparapara the same authority says (page 384) "the native name of Bligh Island, commonly called Ureparapara, is Norbarbar, the place of slopes." Of much the same nature is her consistent use of Q without explanation in the spelling of Melanesian names. We can readily imagine the struggles of her readers to deal with Qat, who appears in many of the myths. It is rather too much to expect in the general public such Melanesian scholarship as should know at once that Qat is not in the least Quat, but that this arbitrary consonant device varies from island to island and the puzzling name at its simplest is really pronounced Pwat and at its most complex may be the highly agreeable Nggmbwat, a whole mouthful.

The Melanesian library is not yet large, accretion is but slow. It is a pleasure to welcome to it these "Islands of Enchantment" and it is not too much to say that it will long remain of value for those who wish to make acquaintance with one of the rudest nooks of this earth. WILLIAM CHURCHILL.

EUROPE

Undiscovered Russia. By Stephen Graham. xvi and 337 pp. Maps, ills., index. John Lane Co., New York, 1912. 9 x 6.

This was an excellent opportunity, but the author has been so intent upon mannerism of composition that the opportunity has been all but lost. It is a record of Russian byways, of travel through lanes and along the rivers, all remote from the railways and the route of common tours. Mr. Graham enjoys the intimate touch with the moujik whom he meets along the road or in the tea houses. He enters into their life, their views of faith and government, the two intimately associated in Russia. The picture is as truly peasant as is "The Angelus," but it is plus the vice of vodka, the peasantry of the moujik is sodden with strong drink raging. This is a Russia scantily known. It is well worth the knowledge of those who are waiting for the great empire of the east to come to its own development. Administrative Russia is all German, the Russia known for good and for ill is frankly imitative of the west; but when the peasant ceases to find his pleasure in intoxication, when he develops into the bulwark of the state it will be well to have more of such intimate record of his life as is suggested in these sketches. Mr. Graham's path was from Archangel up the Dwina, with a side ramble to Pinyega on the edge of the tundra. At Kotlas he left this river and traversed the forest land of Vologda through the valleys of the Sukhon and the Yug. At Vetluga he was turned aside by the cholera and finished his tramp at Moscow. The book would have had far more value if the detail of incident and observation had been more distinct. The author seems to have aimed in his text at some sort of harmony with the few drawings by his Russian artist friends which he has included by way of illustration, something impressionistic and not always comprehensible. WILLIAM CHURCHILL.

POLAR

A Voyage to the Arctic in the Whaler *Aurora*. By David Moore Lindsay. ix and 223 pp. Ills., appendix. Dana Estes & Co., Boston, 1911. 8½ x 5½.

The book is largely a transcription from the diary of a voyage made over twenty years ago. The three projects in view were seal hunting, the relief of the Greely Expedition and whaling. The *Aurora*, a Dundee boat, sailed for the Greenland whaling grounds, and while waiting for the ice to disappear, the party engaged in seal hunting with St. Johns as their base. An account is given of the unrestrained slaughter of seals at that time. The vessel went northward toward the whaling grounds in company with the ships of the Greely relief expedition and hoped to win the prize offered for finding the Greely party. The remainder of the book tells attractively the story of whale fishing.

ROBERT M. BROWN.

ANTHROPOLOGY

The Golden Bough. A Study in Magic and Religion. By J. G. Frazer. Third Edition. Part I: The Magic Art and the Evolution of Kings. Vol. 1, xxxii and 426 pp. Index. 20s. Vol. 2, xi and 417 pp. Part II: Taboo and the Perils of the Soul. xv and 466 pp. Index. Part III: The Dying God. xii and 305 pp. Index. 10s. Macmillan & Co., Ltd., London, 1911. 9 x 6 each.

It sometimes comes to pass, not often, that a work transcends the limits of a mere book, to be reviewed and discussed in the small manner, but becomes an institution. This is eminently the case with "The Golden Bough," and in this light we are to give some consideration to the work, to present to view some of the effect which this work as institution has had upon a group of scientific workers, to note some investigation into the qualifications of the work for the high place which it has long occupied.

In all human probability these volumes now coming from the press are to stand as the final form of this great work. Dr. Frazer has observed a decennial period, the first edition was given to the world in 1890, the second in 1900, and this which bears the date of 1910 is the third. It would be too much to expect a fourth. We now have the half of the full work as it is to be, in fact a little more than the half. Revision and enlargement have been applied to the four volumes which constitute the third edition of the first three parts of the work, the magic art, the taboo, the dying god. Part IV, "Adonis, Attis and Osiris," is to be taken without modification from the general second edition; two concluding parts are now in preparation.

The method which Dr. Frazer has followed, the form in which his conclusions are presented, these are not of his discovery. We have no difficulty in seeing that he has followed on the track of Herbert Spencer, ploddingly rather than with the light step of the enthusiast. In fact "The Data of Religion" might have served him well as a title and have offered opportunity for a delicate recognition of discipleship. Likewise there comes into mind Pliny's great work, the "Historia Naturalis"; this also suggests a model, we shall have to look a trifle closely into the position of Frazer, whether he be nearer Spencer or Pliny.

In any work so encyclopedic we must find an interest in examining the method whereby the directing head of the enterprise, the author, deals with the notes of worldwide reading of himself or others. This implies hacking, a method to which no objection can be raised. A busy worker has just as much privilege to employ diligent readers in his interest as he has the right to permit himself the use of the footnotes in the work of any other author. The critical point arrives when the directing head of the enterprise takes up this raw material and fits it to the plan of his work, the point where the foreman of a research gang takes the higher rank of author. None will deny Herbert Spencer the highest place as author, none would suggest higher than foreman's rank for Pliny. Each of these tireless workers has done up to a certain point what the other has done, each has ransacked the literature of the world for data. Where lies the difference? Pliny has put down in order everything that he could discover, Spencer has weighed his data, has investigated its value, has exercised the prerogative of the editor and the scholar. Is "The Golden Bough" the work of a Spencer or of a Pliny?

In the preface to this third edition Dr. Frazer says that friends have pointed out that certain of his views were anticipated by Hegel; in certifying that this agreement is entirely unexpected he writes "I have never studied the philosopher's writings nor attended to his speculations." Perhaps the English authority does not use the German readily, for this is certainly a most remarkable confession to be made by any student of the theory of religion, inconceivable when coming from a leader in such studies.

The conclusions at which Dr. Frazer arrives are based in his research activity, are supported in his publication, by certain data which he has been able to assemble. Each item must rest upon the accuracy of its original reporter, his ability to see the truth, his willingness to record it. These are conditions which the student must regard in every use he is to make of such material. Now it would be quite out of the question for Dr. Frazer to verify each item by his own endeavor, yet in most cases the error of one observer is in no long time corrected by the next in the field; and all the literature is accessible in the Cambridge libraries. Yet Dr. Frazer seems to have taken all the data at their face value, to have made no attempt to correlate them with the general advance in knowledge of the particular subject.

As all this has a most important bearing on the respectability of this great work, I must be very precise in particulars. On page 338 of Taboo he writes "among the Ojebways husbands and wifes never mention each other's names" and supports this by a reference to Peter Jones. The spelling Ojebways is unusual. In the very long synonymy of the Chippewa this particular form is found but once, yet Dr. Frazer has not taken the pains to consult the publications of our Bureau of Ethnology. Its "Handbook of the American Indians" had for four years been within his reach. On page 21 of the same volume he cites from Mariner's charming story of Tonga the distinction between the How and the Tooitonga, the civil and the religious king; he has not examined more closely in this matter or he would surely have found that since Mariner, who spelt *ad libitum,* Tongan has been reduced to writing and Hau and Tuitonga (the only forms of record in Baker's dictionary of that language) would never find themselves associable in an index with the forms which he employs. On page 32 of the same volume, and many places elsewhere, he writes of the Minangkabauers of Sumatra; why? Flat ignorance and neglect to examine; he is dependent on a paper written in Dutch, and because Minangkabau, preferably Menangkabau, calls for a termination in Dutch he carries that alien derivative form over into English and thereto adds an equally unnecessary plural termination. On page 117 of Part III he cites from Lisiansky, a century ago, the Hawaiian festival of Macahity; for half that time there has been a Hawaiian dictionary in which he could have seen that the word was Makahiki. On page 381 of the Taboo he shows how a Maori word for knife, *maripi,* goes out of use and is replaced by *nekra;* yet the latter is not a Maori word and never could be, for no Polynesian speech allows combination of consonants.

I should be the last to criticize a great work because of faults in orthography. These are not cited because in each case there is a more modern and approved spelling. They are evidential that there has been no attempt to evaluate the data. Like Pliny, Dr. Frazer has found them, like Pliny he has used them. An encyclopedia has authority only in proportion as its articles have been edited. Here we have evidence that "The Golden Bough" has not been subjected to proper editing of its facts.

Ethnologic study is new to English research. In twenty years "The Golden Bough" has laid all investigation upon a Procrustean bed, all research is conducted along the plans which this work has predetermined. Is that a good thing for a science? It has not proved good in English ethnology. We have each year a larger and larger output, yet there is no freedom in research, there is none of that brilliancy of treatment of facts which marks the ethnologic work of the Germans, none of that almost inspired insight into the culture of savage folk which has appeared in American ethnology.

Already have I drawn attention to a fault in method which is fatal. With respect, I think there is a fatal weakness in the plan of the work. Like causes produce like effects, but we are not entitled to believe in the converse. Given similarity of effect we may not assume the same underlying cause. To establish the great central theme of "The Golden Bough" we should have to believe that there is a homogeneous race of men all under equal impulse toward a common end. In biologic science there is no disposition to restrict the evolution of man to a single focus. The more we know of a savage mind the less we see of unity of thought method.

The literature to which in a score of years "The Golden Bough" has given rise is a library in itself, wordy battles have been waged, the end is by no means in sight. My intention has not been in the least to add to the polemics, but to renew attention to the work which not only represents but is the best ethnology in England. Yet I should not be true to my own convictions nor should I be dealing honestly with readers, should I neglect this word of judgment. Few books contain so much to interest and to instruct. It is bright and entertaining; but it must be remembered that we cannot accept Dr. Frazer as an authority any higher than the source of his information and that this argument involves the strong probability of a fallacy. WILLIAM CHURCHILL.

ECONOMIC GEOGRAPHY

The World's Commercial Progress. A Descriptive Account of the Economic Plants of the World and of their Commercial Uses. By W. G. Freeman and S. E. Chandler. viii and 391 pp. Maps, ills., index. Ginn & Co., Boston, 1911. $3. 11 x 8½.

This is a notable volume for educational geography. The title would be more exact if it were given as the World's Commercial Plant Products, since materials of a mineral nature and animal products are not included. The authors have drawn upon large stores of information, and one of them writes on the basis of six years of work in economic botany in various tropical countries. The publishers have given the book an attractive and substantial form, in type, illustration, and binding.

Wheat has the leading position and one of the most extended treatments. There is an account of the entire series of processes from tillage to harvesting and manufacture. The other important cereals are then taken, followed by sugar, cacao, tea, coffee, and tobacco. Then come vegetables, fruits, rubber, timber and fibers. The later parts of the volume are devoted to gums, dyes, oils, and spices. The elimination of some minor products makes the work more valuable for common use.

An introduction sets forth the value of plant products, traces the origin of intercourse and exchange among regions, and suggests other principles of commercial geography. Possibly more important than the text are the illustrations, which include hundreds of half-tones showing almost every phase of production and manufacture in all parts of the world. There are also twelve full-page colored plates, showing among other things, wheat threshing, maize, cacao, the tea plant, cotton, tobacco and cinchona. There are full-page maps showing the areas of production. They are subject to the limitations of all such maps, that they are areal rather than quantitative, and thus often fail to reveal the importance of regions. The volume makes generally available a large amount of good material, and offers great help to all instructors in elementary and commercial geography. A. P. BRIGHAM.

CARTOGRAPHY

Portolan Charts; Their Origin and Characteristics: With a Descriptive List of those Belonging to the Hispanic Society of America. By Edward Luther Stevenson, Ph.D. New York, 1911. (Publications of the Hispanic Society of America. No. 82.)

As interest in the study of discovery and historical geography has increased and a better knowledge of the sources acquired, more attention has been paid to the history and value of portolan charts. The literature of the subject has been, comparatively, so meager and so little has been definitely known that they have been regarded as manuscript curiosities ranking with the illuminated missal and the codex rather than as documents which are "the creations of seamen, navigators, explorers and chart-makers who were leaders in the expansion of geographical knowledge which opened the New World regions of Africa, of India and of America."

It is, therefore, gratifying that the first comprehensive work in English on portolan charts should be illustrated by a description and reproductions of the representative American collection,—that of the Hispanic Society of America. This collection ranks next to that of the British Museum, which is the largest single collection outside of Italy, where, considering their long and continuous service for several centuries, a surprisingly large number are preserved, chiefly in the libraries and museums. That this work has been done by the recognized authority of this country on early cartography makes the account of the origin, character and general development of portolan charts of special value. Dr. Stevenson has accomplished much in original investigation and his works are welcomed as permanent and timely contributions to the study of cartography. This, his latest work, consists of two parts: (1) the history of portolan charts, followed by a bibliography, and (2) a description of the thirty-two charts comprising the collection of the Hispanic Society of America.

In the first part Dr. Stevenson gives a concise and scholarly account of portolan charts and includes a synopsis of the views of Nordenskiöld, Fisher and Fiorini concerning the first charts. As the word "portolan" is a common and confusing misnomer, he draws special attention to the "relationship existing between the ancient periplus, the Italian portolan and the portolan chart of the period of discovery."

He shows how the periplus originated in the accounts of early coast-wise navigation such as the story of Nearchus's Voyages from the Indus to the Euphrates; the Apostle Paul's journey; accounts of special regions; the earliest known and most elaborate periplus, ascribed to Scylax of Caryanda; and later, the so-called Byzantine Stadiasmos, which "may well be considered the most important document known, linking in sense the older Greek periploi with the Italian portolans." He then tells how these accounts of the Greek periploi, with their sailing directions and descriptions of the mainland, were followed in the tenth or eleventh century by the Italian portolan,—a close imitation of the periplus, suggesting the development of this new form from the older Greek. This portolan was, in reality, a harbor book, necessitated by the beginning of commerce between the Mediterranean and European seaports. We are further told how these directions were used for two or three centuries until the portolan chart appeared as a natural as well as necessary development, furthered, probably, by the application of the compass to navigation. This first part of the work is followed by a selected bibliography aiming to include only works bearing directly upon the subject and those of special value. No attempt has been made to include superfluous titles.

The second half of the work consists of the description of the thirty-two charts, together with fifteen photographs of the originals, forming the collection of the Hispanic Society of America.

The value of this collection does not alone depend upon its size but rather upon the history, age, makers, workmanship and state of preservation of the charts. Their history and description is as interesting as their appearance indicates. While many appear to be copies of a common original, it is said no two are alike. The earliest chart in the collection is the one, probably by Giacomo Giroldi, made, as Dr. Stevenson shows by comparison with Giroldi's other work, near the year 1425. This is about 200 years earlier than the oldest portolan chart in the Library of Congress and sixteen years earlier than any in the fine Ayer Collection in the Newberry Library of Chicago.

Other early charts in this collection are those of (2) Petrus Roselli, 1468; (3) Nicolaus de Nicolo, 1470; (4) anonymous chart, late 15th century; (5) Vesconte de Maiolo, 1512; (6) Conde Hoctomanno Freducci, 1524; and so on, up to (32) by Georg Andrea Böckler, 1650.

As an authority on old maps and as a result of his long studies, Dr. Stevenson is able to describe these maps scientifically. He has not been content with the too prevalent form of mere lists of titles, but has fully described and placed each map and has drawn comparisons and conclusions.

So it may be seen that our present day Coast Survey charts, Hydrographic Office charts, Admiralty charts, or by whatever name sailing charts are known in the world's navies, are but the successors to the parchment charts of the fourteenth, fifteenth and sixteenth centuries, made chiefly by Italian and Catalan chart makers until the use of paper and the printing press became general. From that time we may trace successively the growth and expansion of the portolan chart to the famous Dutch Waggoners, the later Zeekaarten, or Zee-atlas of the Dutch, to the Lightningh Columnes or Sea-mirrours,—to the Neptunes of the French and the Pilots of the English, down to the government charts of to-day.

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This annual publication established its reputation from the first as conceived on an admirable plan giving it special utility. From the great output of geographical books and papers in each year are selected for notice those that seem to the editor and his collaborators to be of particular value and usefulness. The selections are almost invariably made with much discernment, and the compilation is a good index to the best geographical literary products of the year. Critical or descriptive notes are added to each title. The editor has the collaboration in the present volume of fifty-eight assistants. There are 1,165 notes, a few of them including several titles. A number of maps are noted, and many geographers would undoubtedly welcome a small enlargement of the annual to include all the most notable map products of the year.

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given except when region explicitly defined by title. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets
(*Including Combined and Special Topographic Maps*)

Arizona. (a) Miami Copper Belt. Surveyed in 1910. 1:12,000. 33°25′0″ - 33°22′40″ N.; 110°56′0″ - 110°52′15″ W. Contour interval 25 ft. Edition of March 1912.

(b) Ray and Vicinity. Surveyed in 1910. 1:12,000. 33°11′32″ - 33°9′28″ N.; 111°1′26″ - 110°58′32″ W. Interval 25 ft. Edit. of Jan. 1912.

California. (a) Biggs Quadrangle. Surveyed in 1909-1910. 1:31,680. 39°30′0″ - 39°22′30″ N.; 121°45′0″ - 121°37′30″ W. Interval 5 ft. Edit. of April 1912.

(b) Butte City Quad. Surveyed in 1909-1910. 1:31,680. 39°30′0″ - 39°22′30″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of March 1912.

(c) Clear Creek Quad. Surveyed in 1910. 1:31,680. 39°45′0″ - 39°37′30″ N.; 121°45′0″ - 121°36′30″ W. Interval 5 ft. Edit. of Feb. 1912.

[Northeastern half of sheet is blank.]

(d) Gridley Quad. Surveyed in 1909-1910. 1:31,680. 39°22′30″ - 39°15′0″ N.; 121°45′0″ - 121°37′30″ W. Interval 5 ft. Edit. of March 1912.

(e) Honcut Quad. Surveyed in 1909-1910. 1:31,680. 39°22′30″ - 39°15′0″ N.; 121°37′30″ - 121°30′0″ W. Interval 5 ft. Edit. of Jan. 1912.

(f) Meridian Quad. Surveyed in 1905 and 1909-1910. 1:31,680. 39°15′0″ - 39°7′30″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of April 1912.

(g) Mt. Goddard Quad. Surveyed in 1907-1909. 1:125,000. 37°30′ - 37°0′ N.; 119°0′ - 118°30′ W. Interval 100 ft. Edit. of Jan. 1912.

(h) Randsburg Quad. Surveyed in 1900. Culture revised in 1911. 1:62,500. 35°30′ - 35°15′ N.; 117°45′ - 117°30′ W. Interval 50 ft. Edit. of Feb. 1912.

(i) Sanborn Slough Quad. Surveyed in 1909-1910. 1:31,680. 39°22′30″ - 39°15′0″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of Dec. 1911.

(j) Tisdale Weir Quad. Surveyed in 1905 and 1909-1910. 1:31,680. 39°7′30″ - 39°0′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. of Feb. 1912.

[Maps (a-f) and (i-j) belong to the series of half-inch-to-the-mile maps of the Sacramento Valley.]

Colorado. Creede and Vicinity. Surveyed in 1910. 1:24,000. 37°56′ - 37°50′ N.; 106°59′ - 106°54′ W. Interval 50 ft. Edit. of Feb. 1912.

Georgia. Milledgeville Quad. Surveyed in 1909. 1:62,500. 33°15′ - 33°0′ N.; 83°15′ - 83°0′ W. Interval 20 ft. Edit. of Feb. 1912.

Illinois. New Athens Quad. Surveyed in 1908-1909. 1:62,500. 38°30′ - 38°15′ N.; 90°0′ - 89°45′ W. Interval 20 ft. Edit. of March 1912.

Kentucky-Indiana. Kosmosdale Quad. Surveyed in 1905, 1908, 1909, and 1910. 1:62,500. 38°15′ - 38°0′ N.; 86°0′ - 85°45′ W. Interval 20 ft. Edit. of April 1912.

[Northeast corner of sheet includes southwestern part of Louisville.]

Michigan. Mason Quad. Surveyed in 1908-1909. 1:62,500. 42°45′ - 42°30′ N.; 84°30′ - 84°15′ W. Interval 20 ft. Edit. of Dec. 1911.

Missouri. Rolla Quad. Surveyed in 1908-1909. 1:62,500. 38°0′-37°45′ N.; 92°0′-91°45′ W. Interval 20 ft. Edit. of Jan. 1912.

Montana. Cut Bank Quad. Surveyed in 1907 and 1909. 1:125,000. 49°0′-48°30′ N.; 112°30′-112°0′ W. Interval 20 ft. Edit. of Jan. 1912.

New York. (a) Delhi Quad. Surveyed in 1907-1909. 1:62,500. 42°30′-42°15′ N.; 75°0′-74°45′ W. Interval 20 ft. Edit. of Dec. 1911.

(b) Hartwick Quad. Surveyed in 1909-1910. 1:62,500. 42°45′-42°30′ N; 75°15′-75°0′ W. Interval 20 ft. Edit. of March 1912.

(c) Ontario Beach Quad. Surveyed in 1894. Culture revised in 1911. 1:62,500. 43°30′-43°15′ N.; 77°45′-77°30′ W. Interval 20 ft. Edit. of Feb. 1912.

(d) Rochester Quad. Surveyed in 1893. Culture revised in 1911. 1:62,500. 43°15′-43°0′ N.; 77°45′-77°30′ W. Interval 20 ft. Edit. of Feb. 1912.

(e) Rochester Special Map. Culture revised in 1911. Surveyed in 1893-94. Culture revised in 1911. 1:62,500. 43°20′-43°5′ N.; 77°45′-77°30′ W. Interval 20 ft. Edit. of March 1912.

[Although not stated in legend, for elevations below 300 ft. the contour interval is 100 ft. on maps (c), (d) and (e). Map (e) a sheet of regular size combined from northern two-thirds of Rochester and southern one-third of Ontario Beach sheets.]

Ohio. (a) Caldwell Quad. Surveyed in 1908-1909. 1:62,500. 39°45′-39°30′ N.; 81°45′-81°30′ W. Interval 20 ft. Edit. of April 1912.

(b) Cambridge Quad. Surveyed in 1907-1909. 1:62,500. 40°15′-40°0′ N.; 81°45′-81°30′ W. Interval 20 ft. Edit. of Jan. 1912.

(c) Canal Dover Quad. Surveyed in 1909-1910. 1:62,500. 40°45′-40°30′ N.; 81°30′-81°15′ W. Interval 20 ft. Edit. of March 1912.

Tennessee-North Carolina. Mt. Guyot Quad. Surveyed in 1883-1885 and 1891. Partial revision in 1898, 1906, and 1909-1910. 1:125,000. 36°0′-35°30′ N.; 83°30′-83°0′ W. Interval 100 ft. Edit. of Jan. 1912.

West Virginia-Virginia. Pocahontas Special Quad. Surveyed in 1909. 1:62,500. 37°30′-37°15′ N.; 81°30′-81°15′ W. Interval 50 ft. Edit. of Dec. 1911.

[Embraces the region shown on the northwest quarter of the regular Pocahontas sheet on twice as large a scale as on that sheet.]

West Virginia-Virginia-Kentucky. Gilbert Quad. Surveyed in 1909. 1:62,500. 37°45′-37°30′ N.; 82°0′-81°45′ W. Interval 50 ft. Edit. of Jan. 1912.

Wyoming-Montana-Idaho. Topographic Map of the Yellowstone National Park, Wyoming-Montana-Idaho. Surveyed in 1883-85. Partial revision in 1910. 1:125,000. 45°2′0″-44°8′20″ N.; 111°6′-110°0′ W. Interval 100 ft. Edit. of Jan. 1912.

[Welcome new edition of the special map of the park. Telegraph and telephone lines and outposts shown in red.]

Maps Accompanying Publications

ALABAMA. (a) Sketch map of northwestern Alabama, showing location of area mapped in the Fayette gas field, the general structure of the region, and the northern and eastern extent of the Pennsylvanian series, in which the gas is found. [1:1,600,000.] [35°-33° N.; 88°20′-86°27′ W.].

(b) Map of Fayette District, Alabama, showing structure on the coal horizon of the Clear Creek and Deadwater sections. 1:31,680. [33°43′-33°37′ N.; 87°52′-87°38′ W.].

Fig. 1 and Pl. VI, "The Fayette Gas Field, Alabama" by C. H. Wegemann, *Bull. 471-A,* 1912, pp. 26-51.

CALIFORNIA. Reconnaissance [Geologic] Map of the Southern End of the San Joaquin Valley, California. 1:500,000. 36°2′-34°50′ N.; 119°30′-118°36′ W. Pl. IX, "Preliminary Report on the Geology and Possible Oil Resources of the South End of the San Joaquin Valley, Cal." by R. Anderson, *Bull. 471-A,* 1912, pp. 102-132.

CONNECTICUT. Preliminary Geologic and Economic Map of Connecticut. 1:500,000. 8 colors. Pl. I, "The Granites of Connecticut" by T. N. Dale and H. E. Gregory, *Bull. 484,* 1911.

[Not a geologic map of the state but a map showing the distribution of granites and gneisses. For preliminary geologic map of Connecticut on which this map is based see under "Connecticut," *Bull. Amer. Geogr. Soc.,* Vol. 43, 1911, p. 954.]

KENTUCKY. Map of the Campton Oil Field, Wolfe County, Kentucky. October 1909. [1:24,000.] [37°44′ N. and 83°33′ W.]. With: [geologic] Index map of eastern Kentucky, showing location of Campton or Wolfe County oil district. [1:5,300,000.] Pl. I, "The Campton Oil Pool, Kentucky" by M. J. Munn, *Bull. 471-A,* 1912, pp. 5-13.

KENTUCKY. Sketch Map of Knox County, Kentucky, Showing Location of Oil and Gas Pools. [1:190,000.] [37°2′ - 36°43′; 84°7′ - 83°34′ W.]. With: [geologic] Index map of eastern Kentucky showing location of Barbourville or Knox County oil field. [1:5,300,000.] Pl. IV, "Oil and Gas Development in Knox County, Ky." by M. J. Munn, *Bull. 471-A,* 1912, pp. 14-25.

UTAH. (a) Geologic Map and Sections of San Juan Oil Field, Utah. 1:63,360. [37°19′ - 37°4′ N.; 110°2′ - 109°43′ W.].

(b) Map of San Juan Oil Field. Same scale and coordinates as map (a). With inset of part of Utah showing location of main map.

Pls. VIII and IX, "Geology of the San Juan Oil Field, Utah" by E. G. Woodruff, *Bull. 471-A,* 1912, pp. 72-100.

[Map (b) a valuable contour map (interval 100 feet), affording a new and more correct delineation of the region than does the Abajo, Utah, topographic sheet (1:250,000; contour interval, 250 feet), which goes back partly to the Hayden Survey.]

WYOMING. Map of Powder River Oil Field, Wyoming. By Carroll H. Wegemann, Assisted by C. J. Hares and Wm. Mulholland. [1:63,360.] [43°37′ - 43°20′ N.; 106°40′ - 106°25′ W.]. With inset map of Wyoming, 1:10,000,000, showing location of main map. Pl. VII, "The Powder River Oil Field, Wyoming" by C. H. Wegemann, *Bull. 471-A,* 1912, pp. 52-71.

NORTH AMERICA

CANADA

ALBERTA. Maligne Lake, Jasper Park, Alberta. From Survey by Mary F. [*sic*] S. Schäffer. 1911. 1:250,000. [52°45′ N. and 117°35′ W.]. With inset showing location of main map. Accompanies, on p. 380, "Mrs. Schäffer's Discovery of Lake Maligne, Canadian Rockies," *Geogr. Journ.,* Vol. 39, No. 4, 1912, pp. 379-381.

[Valuable map of a lake, hitherto unsurveyed, lying in one of the longitudinal valleys of the outer Rocky Mountains between the transverse courses of the Athabasca and Brazeau Rivers, at the head of the Hudson Bay–Arctic Ocean Divide, within the drainage basin of the latter. Cf. Mrs. Schäffer's "Old Indian Trails (of the Canadian Rockies)", Chapters III-V.]

ALBERTA-BRITISH COLUMBIA. Part of the Rocky Mountains North of the Yellowhead Pass from a plane table survey by Professor J. Norman Collie, F.R.S. 1900-11. 1:500,000. 53°35′ - 52°35′ N.; 120°0′ - 117°30′ W. 3 colors. With inset map, 1:20,000,000, showing general location of main map. Accompanies "Exploration in the Rocky Mountains north of the Yellowhead Pass" by J. N. Collie, *Geogr. Journ.,* Vol. 39, No. 3, 1912, pp. 223-235.

[Valuable map embodying original surveys: an additional contribution to our rapidly increasing knowledge of the Rocky Mountains of Canada for which geography is so greatly indebted to alpinism. Prof. Collie's surveys are the first surveys of an extensive area in this part of the Rocky Mountains due to the opening up of the region by the Grand Trunk Pacific Ry.]

AFRICA

BECHUANALAND. Ngamiland: Prismatic Compass Sketch Map of Routes between Tsau and Simati's Village by A. G. Stigand. 1910-1911. 1:2,000,000. 18° - 21° S.; 22½° - 24½° E. With inset, 1:40,000,000, showing general location of main map. Accompanies, on p. 377, "Notes on Ngamiland" by A. G. Stigand, *Geogr. Journ.,* Vol. 39, No. 4, 1912, pp. 376-379.

EGYPT. [Six index maps of the various standard maps published by the Survey Department of Egypt, showing state of progress on Jan. 1, 1910, accompanying "A List of Maps and Plans Published up to March 1, 1910," Survey Dept., Cairo, 1910:]

(a) Index Map for Topographical Series 1:1,000,000 and for Geological Sheets. 1:4,000,000. 32° - 20° N.; 26⅔° - 36° E. 1 color. Pl. I.

(b) Key Map to the 1:50,000 Sheets of Egypt. [Three plates:] (1) 31°36′ - 29°36′ N.; 29°30′ - 32°30′ E. 2 colors. With inset forming southern extension of main map. 29°36′ - 28°36′ N.; 30°15′ - 31°30′ E. 1 color. (2) [in two parts:] (a) 28°36′ - 26°36′ N.; 30°30′ - 31°52.5′ E. 1 color. (b) 26°36′ - 24°36′ N.; 31°30′ - 33°0′ E. 1 color. (3) 24° - 22° N.; 31°0′ - 33°15′ E. 1 color. With inset forming northern extension of main map. 24°36′ - 24°0′ N.; 32°15′ - 33°15′ E. 1 color. Pls. II, III and IV.

(c) Key Map to the 1:10,000 Sheets of Egypt. 1:750,000. 2 colors. [Five plates:] (a) Lower Egypt. 31°36′ - 30°0′ N.; 29°30′ - 32°30′ E. (b) Delta Barrage to south boundary of Beni Suef. 30°12′ - 28°48′ N.; 30°15′ - 31°30′ E. (c) Mudiria Aswan (North of Shellal). 25°24′ - 24°0′ N.; 32°30′ - 33°3′ E. (d) Kharga. 26°0′ - 24°24′ N.; 30°15′ - 31°0′ E. (e) Mudiria Beheira. [Limits, including inset: 31°36′ - 30°15′ N.; 29°25′ - 30°57′ E.]. Pls. V-IX.

(d) [Key-map to the sheets of] North Gharbia 1:25,000. 1:750,000. 31°36′ - 31°12′ N.; 30°15′ - 32°0′ E. 1 color. Pl. X.

(e) [Key map to the 1:1,000 sheets of] Alexandria. 1:50,000. [31°12′ N. and 29°53′ E.]. Pl. XI.

(f) Provisional Key Map to the 1:1,000 sheets of [N.E.] Cairo. 1:25,000. 2 colors. [30°3′ - 30°5′ N.; 31°16′ - 31°18′ E.]. Pl. XII.

PORTUGUESE GUINEA. Sketch showing routes of P. H. G. Powell-Cotton & C. S. Burnett. 1911. 1:1,000,000. 12°30′ - 11°30′ N.; 15°4′ - 14°48′ W. With inset showing location of main map. Accompanies, on p. 396, note on Portuguese Guinea, *Geogr. Journ.,* Vol. 39, No. 4, 1912, pp. 395-397.

SOUTHERN NIGERIA. Sketch map of part of Southern Nigeria from prismatic compass traverses by Rev. George T. Basden, M.A. 1900-11. 1:200,000. 6°15′ - 5°51′ N.; 6°37′ - 7°16′ E. 1 color. With inset map showing approximate area covered by Ibo tribe. 1:7,500,000. 8⅓° - 3⅓° N.; 4° - 10° E. Accompanies "Notes on the Ibo Country and the Ibo People, Southern Nigeria" by G. T. Basden, *Geogr. Journ.,* Vol. 39, No. 3, 1912, pp. 241-247.

[Valuable detailed map embodying original route surveys.]

ASIA

CHINA-INDIA. (a) Sketch Map to illustrate the paper on Chinese Frontiers of India by Archibald Rose, H.B.M. Consul, Têng-Yüeh, Yün-nan. 1:15,000,000. 40° - 4° N.; 57° - 108° E. 2 colors.

(b) Sketch Map of the Burma-China Frontier. 1:7,000,000. 31° - 14° N.; 92½° - 103½° E. 2 colors.

Accompany "Chinese Frontiers of India" by A. Rose, *Geogr. Journ.,* Vol. 39, No. 3, 1912, pp. 193-223.

[Distinction made between definite and approximate sections of the frontier.]

TIBET-INDIA. Sketch Map of the route of Capt. F. M. Bailey through South Eastern Tibet and the Mishmi Hills. 1:1,000,000. 29°30′ - 27°40′ N.; 96°20′ - 98°40′ E. 1 color. With inset, 1:20,000,000, showing location of main map. Accompanies "Journey through a Portion of South-Eeastern Tibet and the Mishmi Hills" by F. M. Bailey, *Geogr. Journ.,* Vol. 39, No. 4, 1912, pp. 334-347.

[Valuable route survey of the ill-known region about the constricted upper courses of the Yang-tze, Mekong and Salween Rivers. Route led to the source of the Irrawady.]

TURKEY IN ASIA. A. Philippson: Geologische Karte des westlichen Kleinasien. Blatt 3. 1:300,000. 39°0′ - 37°28′ N.; 25°50′ - 28°10′ E. 23 colors. Accompanies "Reisen und Forschungen im westlichen Kleinasien. II. Heft: Ionien und das westliche Lydien" by A. Philippson, *Ergänzungsheft zu Pet. Mitt., Nr. 172,* 1911.

[The second sheet of this admirable geologic map of western Asia Minor by Prof. Philippson, based mainly on his own surveys. The first sheet was listed under "Asia Minor" in the *Bull.,* Vol. 43, 1911, p. 708. For references to the topographic map which forms the basis of the geologic sheets see *Bull.,* Vol. 43, 1911, pp. 548-549.]

AUSTRALASIA AND OCEANIA

Papua. Sketch Map showing explorations in the Western Division of Papua by The Hon. Staniforth Smith. 1910-11. 1:750,000. 6°10′ - 8°0′ S.; 141°55′ - 145°22′ E. 3 colors. With inset, 1:10,000,000, showing location of main map. Accompanies "Exploration in Papua" by M. S. Smith, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 313-334.

[Valuable extensive route survey of hitherto unexplored tracts.]

Queensland. (a) Sketch Map of the Burketown Mineral Field showing lease groups & limestone areas. By Lionel C. Ball, B.E., Assistant Gov't. Geologist. 1910. [1:290,000.] [18°22′ - 19°5′ S.; 138°25′ - 138°50′ E.]. Accompanies, facing p. 7, "The Burketown Mineral Field" by L. C. Ball, *Publicat. No. 232,* Geol. Survey of Queensland, 1911.

Queensland. (a) Geological Sketch Map of Einasleigh and Vicinity. [1:31,680.] [18°25′ S. and 144°10′ E.].

(b) Geological Sketch Map, Eastern Portion of Etheridge Goldfield. [1:380,000.] [18°5′ - 19°10′ S.; 143°50′ - 144°30′ E.]. 4 colors.

(c) Sketch Plan of Auriferous Area, Oaks G[old] F[ield]. [1:15,840.] [18°55′ S. and 144°15′ E.]. 4 colors.

Accompany "The Oaks and Eastern Portion of the Etheridge Goldfields (Report on)" by E. O. Marks, *Publicat. No. 234,* Queensland Geol. Surv., 1911.

EUROPE

France. (a) Carte des Gisements de Coquilles Comestibles de la partie de la côte de la Manche comprise entre Le Havre de St. Germain et l'Anse de Vauville. Dressée par M. L. Joubin, Professeur au Muséum d'Histoire Naturelle à Paris. Nov. 1910. 1:44,500 approx. 49°35′ - 49°12′ N.; 1°59′ - 1°37′ W. 7 colors.

(b) ——— comprise entre l'Anse de Vauville à [*sic*] Saint-Vaast. Dressée par ———. 1:44,500 approx. In two parts; inclusive limits: 49°45′ - 49°34′ N.; 1°59′ - 1°10′ W. 6 colors.

Accompany "Études sur les Gisements de Coquilles Comestibles des Côtes de France: La Presqu'île du Cotentin" by L. Joubin, *Bull. de l'Inst. Océanogr. de Monaco,* No. 213, July 10, 1911.

[Similar maps listed in *Bull.,* Vol. 43, 1911, under "France" on p. 234 and under "France" (first entry) on p. 392.]

Germany. (a) Die Umgebung der Mineralquellen von Germete bei Warburg. 1:25,000. [51°29′ N. and 9°5′ E.]. 17 colors.

(b) Die Umgebung der Solquellen von Calldorf in Lippe. 1:50,000. [52°8′ N. and 8°55′ E.]. 13 colors.

Taf. 5 and 6, "Die Quellen von Germete bei Warburg und von Calldorf in Lippe" by A. Mestwerdt, *Jahrb. der Kgl. Preuss. Geol. Landesanstalt,* Vol. 32, Part I, No. 1, 1911, pp. 145-161.

POLAR

Greenland. (a) Kartenskizze der Umgebung von Karsuarsuk, Nordseite der Halbinsel Nugsuak, N.W. Grönland, topogr. und geol. aufgenommen von Arnold Heim, 3. VIII. 1909. 1:30,000. [70¾° N. and 53° W.]. 8 colors. Oriented S. Pl. IX, "Über die Petrographie und Geologie der Umgebungen von Karsuarsuk" by A. Heim. *Meddelelser om Grönland,* Vol. 47, 1911, pp. 173-228.

Greenland. Nordboruiner i Julianehaab Omegn. [1:600,000.] 61°18′ - 60°23′ N.; 47°12′ - 45°0′ W. Pl. XXV, "Kirkeruiner fra Nordbotiden m. m. i Julianehaab Distrikt" by M. Clemmensen, *Meddelelser om Grönland,* Vol. 47, 1911, pp. 283-358.

[Map showing the ruins of the ancient Norse settlements in southern Greenland.]

Antarctic. South Polar Regions to illustrate the paper by H. R. Mill, D.Sc., LL.D. 1:40,000,000. Polar cap within 30° S. approx. 1 color. Accompanies "Ten Years of Antarctic Exploration" by H. R. Mill, *Geogr. Journ.,* Vol. 39, No. 4, 1912, pp. 369-375.

[Shows land discovered since 1900.]

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BULLETIN

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ANTARCTIC NAMES

BY

EDWIN SWIFT BALCH

The South Polar regions, in respect to their nomenclature, are different from every other part of the world. As there are no inhabitants, there are no native names. All the names applied to all places beyond 60° S., have been given either by explorers or by stay-at-home geographers. While this nomenclature is in most cases satisfactory, it is, as yet, not entirely so. Some confusion has resulted from the natural tendency of each nationality of adopting the names given by its own explorers. Places have been named, then renamed, then perhaps renamed again. But although the Antarctic region is "No Man's Land" in International Law,* yet at present it is the stamping ground of explorers and scientists, and it would seem therefore as if scientific geographers had full sway and should crystallize Antarctic names in accordance with the claims of discovery.

A philosophic nomenclature of the Antarctic regions must, in the nature of things, be based on geographic and historic facts. Certain names may well be descriptive and others should be commemorative. This is tantamount to saying that Antarctic nomenclature must be founded on truth and justice, since geography and history are simply records of things as they are or of events which have happened. A proper Antarctic nomenclature must have its source in loyalty to humanity and to science, and not spring from servile obedience to national prejudices and national greed. The golden rule of doing unto others as you would like done unto yourself should ever be borne in mind, and international fair play should insist upon justice being awarded to all.

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* Thomas Willing Balch: "The Arctic and Antarctic Regions and the Law of Nations": *The American Journal of International Law*, 1910. Thomas Baty: "Arctic and Antarctic Annexation": *Law Magazine and Review*, Vol. XXXVII, 1912, pp. 326–328.

Since the Antarctic regions are "No Man's Land," and belong to the human race collectively, it seems self-evident that any names invented and applied to them as a whole, or used arbitrarily to designate large parts of them, whether as halves or quadrants or segments, or in any other divisions though convenient, should be international.

Smaller portions of the Antarctic regions, on the contrary, while politically "No Man's Land," historically belong to their discoverers. And from this fact springs automatically the correct local Antarctic nomenclature. Priority of discovery should be the guiding principle of the historical geographer. The claims of the explorers should be thought of first. The men who risked their lives and added to the sum of knowledge deserve to be commemorated by having their names attached to their discoveries. But often explorers have christened their discoveries by other names than their own, thus blotting out their most visible memorial to fame, and it is occasionally difficult to decide whether it is wisest to retain the name given by an explorer or to replace it by his own name. If the names of Antarctic voyagers, however, are applied to places within the Antarctic regions, they should always be applied to their own discoveries or at least confined to those parts where they have travelled, for it is historically confusing if they are connected with localities where the explorers themselves have not been. There are many crevasses in Antarctic nomenclature for historical geographers to fall into, but they can keep out of some of them by sticking to priority of discovery.

Next to the explorers themselves, the men who deserve to be commemorated are the men who supplied the funds. Financiers like Grinnell in the north, the Coats and Longstaff in the south, should never be forgotten. They handed out the cash to outfit expeditions, and their share was just as vital as that of the men who carried out those expeditions.

Confusion about names sometimes arises owing to different explorers having given different names to the same place. Confusion also results from the fact that in some cases names have been duplicated. Difficulties also sometimes occur because a wrong name or a later name has become identified with a place. It is important for the sake of clearness that all such errors be corrected as soon as possible. Priority of discovery should be the guide. In the few instances of duplications of names in the Antarctic, the one last given should be changed. When different names have been given to the same place, the first appellation should have prior rights, and when a wrong name has become accepted through custom, it should be banished and a correct one substituted.

A rather curious phase of thought may be noticed in the fact that explorers, when giving names to new discoveries, seem to turn to the leading political, not scientific, personages, in their own land. In the Antarctic we find among others such names as Louis Philippe Land, King Edward VII Land, King Oscar II Land, South Victoria Land, Kaiser Wilhelm II Land, Fallières Land, etc. And why rulers should be honored in this way in the South Polar regions is hard to see. It would seem as though explorers would turn to the names of leading geographers and scientists of their own nation in preference, to men like Humboldt and Rennell and Reclus and Pasteur and Darwin: but for some mysterious reason they do not. The name of Dalrymple, so far as I know, does not appear on Antarctic charts, and yet it would seem as though he might have been commemorated by his own countrymen. Dr. W. S. Bruce* applied a somewhat drastic remedy to the overindulgence in royal names, by dropping Kings and Kaisers and shortening such names into Edward Land, Wilhelm Land, etc. The innovation seems one to be commended.

The striking example in Antarctic history of how names should be given is found in the nomenclature applied by Wilkes to consecutive parts of the great land he discovered. With the exception of Termination Land, a well found geographic name, all the names Wilkes applied to lands or islands, are commemorative of officers of his expedition. Knox, Budd, Totten, North, Carr, Alden, Case, Hudson, Reynolds, Eld, Ringgold, and also Piner, whose name was given to a bay, thanks to Wilkes' thoughtful and just tribute, will always remain associated with the great discovery in which they bore their share. Wilkes' modesty prevented him from attaching his own name to his discoveries, an omission which the sense of justice of historical geographers fortunately rectified.

In attempting to formulate a geographic and historic nomenclature for the Antarctic regions, one naturally begins with the names for the larger areas. It is known now that round the South Pole there is one great mass of land covered with ice and snow, forming a vast frozen continent. A considerable area of this was known to the early American sealers, enough in fact for Edmund Fanning in 1833 to write twice of it as "the continent of Palmer's Land."* This appears to be the earliest recognition in print, based on actual knowledge, that there was an Antarctic land big enough in size to be considered as continental. No attention, however, was paid at the time to Fanning's remarks, which were indeed nearly forgotten until republished by the writer in 1902.† But as a question of nomenclature only, these statements of Fanning are also the earliest in which a definite name was applied to the then known mass of continental Antarctic land and the original name for the South Polar continent therefore was PALMER LAND. The lands in the Antarctic regions, however, whose discovery placed emphatically before the world the knowledge that there was a continent and not an ocean at the South Pole, were those discovered by Lieutenant Charles Wilkes, U. S. N. These lands were named by him The Antarctic Continent, and this name must, in the nature of things, always remain as one of the names of the entire landmass. A better name, however, because shorter, is the admirable one proposed by Sir John Murray, Antarctica, and wisely, this has been universally adopted. A better form for it perhaps would be its phonetic rendering, Antartika, but that is a minor detail, and, moreover, it is probably unattainable in English.

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* *Polar Exploration*, 1911.

There have been several attempts made to find suitable names for the larger areas of Antarctica. The first probably was brought forward in 1899 by Sir Clements R. Markham, who suggested dividing the Antarctic into four quadrants‡ which he called respectively: from the Meridian of Greenwich to 90° W., the Weddell Quadrant; from 90° W. to 180°, the Ross Quadrant; from 180° to 90° E., the Victoria Quadrant; from 90° E. to the Meridian of Greenwich, the Enderby Quadrant. Dr. F. A. Cook§ suggested calling these quadrants the American Quadrant, the Pacific Quadrant, the Australian Quadrant, and the African Quadrant, each of them to be south of the respective continent or ocean after which it would be named. Another proposition of the same kind brought forward, I believe, by Mr. Henryk Arctowski, is to divide the Antarctic into three segments, and to call each segment after the ocean which faces it, the Atlantic, the Indian and the Pacific.

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* *Voyages*, etc., pp. 103, 476.

† *Antarctica*, p. 91.

‡ *The Geographical Journal*, 1899, pp. 473-481.

§ A. W. Greely: *Handbook of Polar Discoveries*, Boston, Little, Brown and Company, 1906, p. 277.

None of these propositions seems available. The nomenclature suggested by Sir Clements R. Markham is impossible, for the self-evident reason that it is national and not international. The names proposed by Dr. Cook and Mr. Arctowski, because they are international and because they locate geographically the position of the quadrant or segment, are much more appropriate than those advanced by Sir Clements R. Markham. Nevertheless the names suggested by Dr. Cook and Mr. Arctowski do not seem strictly practical. They are out of keeping with geographic nomenclature anywhere in the world. Men have always given names to large areas of land or water, and then have given names to portions of these areas; that is, geographic names always apply to definite localities. Thus we have America, North America, South America; and Africa, Central Africa, North Africa, East Africa, West Africa and South Africa. And we do not find such subdivisions for instance as Mediterranean Africa, Atlantic Africa, Indian Africa and Antarctic Africa, which would exactly correspond to the nomenclatures suggested for Antarctica by Dr. Cook and Mr. Arctowski. The fact that no such arrangement has ever been adopted in any corner of the world, shows that it is not a natural, that is, not a good one.

Another method of naming the larger areas of Antarctica springs from the fact that it is situated partly in the Western and partly in the Eastern hemispheres. The meridian of Greenwich and the 180th meridian bisect Antarctica into two rather unequal portions and it is a natural evolution to call these two parts West Antarctica and East Antarctica. The first proposition to this effect was made by the writer himself. While working over the records of Antarctic discovery, it soon became apparent that there was no name by which to refer collectively to the lands—the South Shetlands, the Powell Islands, Palmer Land, Graham Land, etc.—in the western Antarctic. One could not use constantly the cumbersome appellation "the lands south of South America." The writer thought a good deal about this and the solution finally came accidentally. In a letter of July 24, 1901, to the Paris *New York Herald,* which was published on July 27, 1901, the writer said "Nathaniel B. Palmer, of Stonington, Conn., discovered and first sailed along the northern coast of Western Antarctica." The name was found and the writer proposed in 1902* the names West Antarctica and East Antarctica for the western and eastern portions respectively of the Antarctic Continent. For, of course, if the name West Antarctica is applied to the lands in the western hemisphere, the name East Antarctica must be applied to the lands in the eastern hemisphere.

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* *Antarctica*, 1902, pp. 12–13.

These names were also invented independently by Dr. Otto Nordenskjold during the winters of 1902 and 1903 at Snow Hill on the coast of Nordenskjold Land.* He explained clearly his reasons for choosing these names. And here the writer would like to put on record his appreciation of the courtesy shown to him by Dr. Nordenskjold. Dr. Nordenskjold, than whom no one was ever fairer or more impartial, has, when discussing Antarctic nomenclature,† invariably referred to the writer's priority in the invention of the names West Antarctica and East Antarctica. In return, I wish to accentuate the fact that these names were thought out independently by Dr. Nordenskjold, and that his use of them has probably insured their universal adoption.

Further studies in Antarctic history and nomenclature, however, have led once more by evolution Dr. Nordenskjold and the writer in the same direction in a search for available names. The name West Antarctica described at first perfectly the land complex of the Shetlands, Powell Islands, Palmer Land, Graham Land, etc. Since the discovery of Edward Land and Coats Land, however, both of which belong to West Antarctica, it no longer does so sufficiently. There is need of a more specialized name. The writer has occasionally used for Palmer Land, Graham Land, etc., the appellation "Northern West Antarctica."‡ And Dr. Nordenskjold in his recent work suggests that a definite name be given to these lands and suggests "Nordöstlich West Antarctica" or for shortness "Nordwestantarctica."§ But is this terminology which once more suggested itself independently to Dr. Nordenskjold and myself the best? I think not. For if there is a Northern West Antarctica, there should be a Southern West Antarctica. And by analogy there ought to be a Northern East Antarctica and a Southern East Antarctica. And none of these three latter names is in anywise suitable. Yet some names are imperative, as anyone who attempts to write about Antarctic discovery will soon find out.

It would seem as if the solution consisted in carrying further the terminology in accordance with the hemispheres. Besides the divisions into halves, Antarctica might be divided into quarters. Here we have the quadrant idea of Sir Clements R. Markham, in itself a good idea. If the hemispherical terminology be applied to this, West Antarctica would be divided into Eastern West Antarctica between 0° and 90° W., and Western West Antarctica between 90° W. and 180°: and East Antarctica would be divided into Eastern East Antarctica between 180° and 90° E., and Western East Antarctica between 90° E. and 0°. A small map inscribed with these names only is published with this article in order to present them more clearly. If a still more specialized name is deemed necessary for the peninsula from Palmer Land to Fallières Land inclusive, Northeastern West Antarctica, as suggested by Dr. Nordenskjold, would answer the need. It might also be possible, for everything south of 80°, to use the term Central Antarctica, which would be susceptible of division also into Central West Antarctica and Central East Antarctica. It would, however, be rather cumbersome to add these latter names. The division into quarters, with possibly the name suggested for the peninsula by Dr. Nordenskjold, ought to be amply sufficient for clearness. The greatest drawback to these names is their length, and this may militate against their adoption. It is questionable, however, if they could be shortened in English. It would seem impossible to abbreviate Eastern and Western into East and West without destroying the euphony of the names. Whether geographers will put the seal of approval on this suggested nomenclature will depend, of course, on how much they consider it necessary.

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* *Antarctica or Two Years amongst the Ice of the South Pole*, 1905, pp. 68-69.

† *Antarctica or Two Years amongst the Ice of the South Pole*, p. 69. *The Geographical Journal*, 1911, Vol. XXXVIII, p. 287. *Die Schwedische Südpolar Expedition*, p. 64.

‡ *Bulletin American Geographical Society*, February, 1911, p. 87.

§ *Die Schwedische Südpolar Expedition*, p. 66.

All other names in Antarctica, in my opinion, need to be local only, and as far as possible should commemorate the explorers themselves, or the men who made the expeditions possible. And, in applying names to local parts of Antarctica, it must be noted that Antarctica consists of a mainland and islands. It is necessary, for geographical clarity, that all coastal areas of the mainland should have special names. These should receive the additional surfix of "land." Dr. Nordenskjold has recently suggested* designating Antarctic coastal lands by the surfix "coast" instead of "land." I should deprecate such a change. The term "land" has been generally used in the polar regions to describe new landfalls. It is more descriptive and accurate than "coast," for it includes a certain amount of the *hinterland*. It seems to me the term "land" should be reserved for the mainland as opposed to "island": and when the insularity of any discovery is proved the term "land" can be changed into "island" almost automatically. The term "group" instead of "islands" must be used in two or three instances for special reasons. Archipelago is perhaps best avoided on account of its length. Any parts of the Great Ice Cap actually explored might well receive the surfix of "plateau."

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* *Die Schwedische Südpolar Expedition*, pp. 69–70.

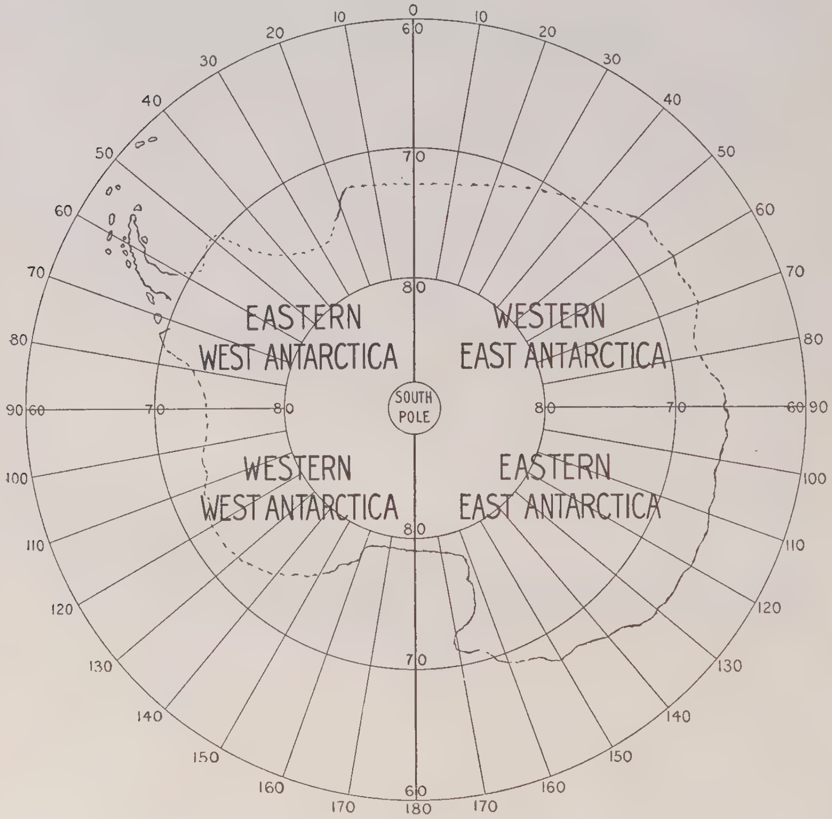

CHART OF

ANTARCTICA

SHOWING SUGGESTED HEMISPHERICAL NOMENCLATURE

DRAWN BY EDWIN SWIFT BALCH MAY 1912

When one turns to the local nomenclature of Antarctica, the proper starting point for its examination is found at once by obeying the guiding principle of priority of discovery. And since the earliest inroads towards the far south were made in West Antarctica, that region should be studied first. Although it is probable that we shall never know who made the earliest Antarctic discovery, yet on some old maps, dating at least as far back as 1570, there is charted south and east of Terra del Fuego, land with a gulf called Golfo di S. Sebastiano and an island called Y de Cressalina.* And in their shape and orientation there is a striking resemblance to Bransfield Strait and its surrounding shores. It may be therefore that the discovery of land in West Antarctica occurred about the middle of the sixteenth century. This, however, cannot be proved from present knowledge.

The oldest record of crossing 60° S. is the statement made by Laurens Claess of Antwerp, who says that in 1603 he was in a ship commanded by Don Gabriel de Castiglio, that they reached 64° S., and that they had a great deal of snow: but he does not mention sighting land.† The next oldest record is the short account published in 1622 at Amsterdam‡ stating that high mountainous land had been discovered by Dirck Gerritsz in 64° S., south of the Straits of Magellan. The attribution of discovery to Gerritsz was disproved by Dr. Arthur Wichmann,§ but the discovery itself has not been disproved. The account in Herrera, however, attributing the discovery in 64° S. to Gerritsz; and the fact that Laurens Claess, who says he went to 64° S. with Castiglio, had been one of Gerritsz' companions, certainly point towards Castiglio as the sea captain who made the discovery. The position given in Herrera corresponds most nearly with the present Liège, Brabant and Anvers Islands. And it is certainly a curious coincidence that these names should have been given to the spot which corresponds most nearly with that written about in Amsterdam in 1622, and that they are placed near the very parallel mentioned by the Flemish sailor: for every reason, therefore, these names should be considered as fixed.

But how about a name for these three islands together. The name Dirck Gerritsz Archipelago was once applied to all Northeastern West Antarctica. Then it was transferred to the Liège, Brabant and Anvers Islands. Later these islands were called the Palmer Archipelago. Quite recently, Dr. Nordenskjold has suggested calling them Belgica Archipelago. None of these names seems a good one to me. There is no absolute need of having any special collective name for these three islands, but if one is to be given it should be that of the still not certainly known mariner—possibly Don Gabriel de Castiglio—who before 1622 sighted land south of Cape Horn. It would seem as if further information as to their probable discoverer might be sought for and awaited before any collective name be applied to them finally as an archipelago, but temporarily the most available name would appear to be Castiglio Islands or Castiglio Group, a name which I place on one of the charts accompanying this article to let other geographers actually see it.

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* *Antarctica*, pp. 51–53.

† *Antarctica*, 1902, pp. 46–51.

‡ Herrera: *Description des Indes Occidentales.*

§ *Dirck Gerritsz*, 1899.

The next discoveries made in the southern portions of the Western hemisphere were some semi-Antarctic islands, the Sandwich Group, the rediscovered South Georgia, and the still uncertain Swain Island. Their nomenclature calls for no remark, except that of the Sandwich Group. Originally spoken of as Sandwich Land, they cannot be called Sandwich Islands on account of the archipelago in the Pacific bearing that name, and Sandwich Group has been wisely adopted.

Following these discoveries came those of the outlying chain of islands of Eastern West Antarctica. There are really three groups of these islands, in approximately the same parallels of latitude. The most westerly of these groups was discovered by William Smith, of Blythe, England, whose accidental landfall Dr. Nordenskjold[*] was the first to really gauge the importance of. Smith called the islands he discovered the South Shetlands, a name ever since applied not only to the western group, but also to the middle group of Elephant and Clarence Islands. Dr. Nordenskjold now suggests calling the western group, William Smith Group, after their discoverer: an excellent suggestion, especially if shortened into Smith Group.

The most easterly of these groups was discovered by the British sealer George Powell and the American sealer Nathaniel B. Palmer in December, 1821. Powell says he was the first to sight these islands to which he gave his own name. They are usually called the South Orkneys, a name apparently given by Weddell, and although it is doubtless too late to change that name, yet the original name Powell Group or Powell Islands should also be restored as an alternative. Some geographers, Dr. Hugh Robert Mill, for instance,[†] have already followed the writer in so doing.

The middle group, Elephant and Clarence Islands, has no special name as yet. Dr. Nordenskjold[‡] thinks it ought to have one, and with this I heartily agree. For a name, however, he suggests

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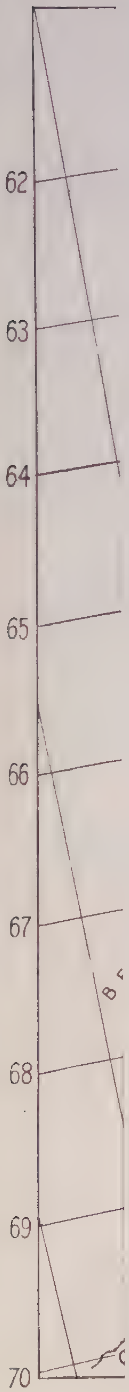
[*] *Antarctica or Two Years amongst the Ice of the South Pole*, pp. 67–79.

The Siege of the South Pole.

[‡] *Die Schwedische Südpolar Expedition*, p. 70.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Powell's, and here I am at odds with him. For in the first place Powell's name is already rightfully attached to the eastern group, and furthermore there is no evidence that the middle group was discovered by Powell. I do not know who did discover the middle group, but doubtless it was some sealer who did not record his discovery. The rightful name for this group, therefore, is hard to specify. The discoverer may still be identified, in which case there should be no hesitation. If a temporary name, however, is wanted, that of James P. Sheffield has distinct claims to consideration. Sheffield commanded the second recorded expedition to the Shetlands, and he made the second recorded landing in Antarctica. It is by no means proved that he had heard of Smith's discovery of the Shetlands: in fact the evidence tends to show he had not.[*] In view of these facts, I would suggest that the middle group, Elephant and Clarence Islands, be called Sheffield Group.

South of the Shetlands lies Bransfield Strait, correctly named after the English captain whose ship's keel is the first recorded as having plowed its waters. In the midst of the strait lies Deception Island with a fine roomy harbor, Yankee Harbor. It is not known who discovered and named this island nor this harbor, but Yankee Harbor appears to be first mentioned in print in 1833 by Edmund Fanning.[†] The earliest use in manuscript of the name Deception I have seen is in the letter of E. Fanning and B. Pendleton to N. B. Palmer, dated Stonington, July 21, 1821.[‡] Dr. Charcot,[§] however, called attention to the fact that in the voyage of 1820-1821, the American sealing fleet sailed to Yankee Harbor as if they knew beforehand all about it: and he thinks therefore that Sheffield and N. B. Palmer may have already been there in the *Hersilia* in 1819-1820, in following the *Esprito Santo* of Buenos Aires.[‖] Dr. Charcot reasons further that Deception Island may have been known still earlier to some Argentine sealers. The matter is hopelessly tangled up and impossible to unravel from any data now accessible. But it shows once more that everything is not yet known about the history of Antarctic discovery: that there were probably other voyages than those so far recorded in print: and that possibly the statement of Dr. Berghaus[¶] that sealers had plied their vocation in the Shetlands before William Smith's discovery, is correct. Further information is certainly badly needed. The name of Yankee Harbor was afterwards changed to Port Foster after the captain of the *Chanticleer*. It is important that it should be restored for several reasons. It recalls a vanished period of Antarctic history. In Yankee Harbor the early American and English sealers sheltered their boats. And as there seems to be good evidence that the name Yankee was simply the mispronunciation of the name English by the American Indians, the name Yankee Harbor applies equally well to a port visited by Americans and Englishmen.

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[*] *Antarctica*, pp. 78–79. *Bulletin American Geographical Society*, 1909, Vol. XLI, pp. 476–477.

[†] *Voyages Round the World*, etc., pp. 434–440.

[‡] *Bulletin American Geographical Society*, Vol. XLI, 1909, p. 483.

[§] *Le Pourquoi-Pas? dans l'Antarctique*, pp. 31–33.

[‖] *Bulletin American Geographical Society*, Vol. XLI, 1909, pp. 476–477.

[¶] Otto Nordenskjold: *Die Schwedische Südpolar Expedition*, p. 35.

To the southward of Deception Island there are several other islands. The largest of these was called, probably by some member of De Gerlache's expedition, Trinity Island. This name is a good one, as it was once used for the northern mainland by Weddell. The second biggest island was christened Pendleton Island by Dr. Nordenskjold, after the senior captain of the first American sealing fleet: the name is a most fitting one and should be adopted. These islands are separated from the mainland by a sound, named by D'Urville Orléans Channel, a name which should also be retained.

The mainland of West Antarctica, was probably first sighted, as far as can be judged from known records, by Nathaniel B. Palmer. Fanning's account can certainly be construed as meaning that Captain Pendleton had the first glimpse, from Deception Island, of the mainland. But Mrs. Loper, Captain N. B. Palmer's niece, has told me that she has more than once heard her uncle, a very keen eyed man, relate how he had discovered Palmer Land from Deception Island. Palmer certainly was the first to explore the coast, and it was first charted as Palmer Land by Powell; then it was charted as Trinity Land by Weddell; then as Louis Philippe Land by D'Urville. The name Palmer Land, restored to this coast by Dr. Nordenskjold and the writer, is in all respects the most fitting name, and it should cover the mainland from 58° W. to 61° W. The name Louis Philippe Land should be retained for the extreme peninsula of the mainland, from 58° W. to Antarctic Sound.

At the eastern extremity of Louis Philippe Land is a mountain, 632 meters high, which is now sometimes charted as Mount Bransfield. Its original name, I believe, was Mount Hope, and it might be well to restore this, because, as far as known now, Bransfield does not seem to have sighted any part of the mainland.

On the east coast of Northeastern West Antarctica, almost all of the names given by D'Urville, Ross, Larsen and Nordenskjold should be definitely accepted. D'Urville, Joinville, Dundee, Paulet, Vega, Ross, Seymour, Snow Hill and Robertson Islands are all good. So are Antarctic, Sidney-Herbert, and Admiralty Sounds; Erebus and Terror Gulf; and Crown Prince Gustav Channel when shortened to Gustav Channel. A long strip of this eastern coast, between 58° W. and 61° W., that is between Louis Philippe Land and Oscar Land corresponds exactly with Palmer Land on the north shore. I have already proposed[*] for this land the name of its gallant explorer, Nordenskjold Land, and also charted it in 1909 under that name. The most elementary justice requires this appellation. Nordenskjold Land makes a great curve enclosing a great bay, which I named and charted in 1902 as Larsen Bay[†] in commemoration of Larsen's discoveries, and this name has been already silently accepted. The shore of the mainland between 60° and 61° W., down to 66° S. will probably retain the name of King Oscar II Land, given to it by Larsen, but shortened into Oscar Land. The shore of the mainland between 66° S. and 67° S. deservedly bears the name of Foyn Land, because Svend Foyn was the principal backer of Larsen's two cruises in the *Jason*.

The coast beyond Foyn Land, from 67° S. on, is still unnamed. Nor is it known positively who first sighted it. Possibly it was Benjamin Morrell. Morrell states[‡] that on March 17, 1823, he was off a coast in about 48° W., and 67°-68° S., and that he saw it continuing, with mountains of snow, a long distance southward. He speaks of this land as New South Greenland, a name which has fallen into almost complete desuetude. He must have seen land somewhere near his stated latitude, for his account is the first extant by a number of years of any land southward of Joinville Island. There are certain statements by Fanning, however, as well as certain other evidences which I formerly discussed at length—especially the probability that Morrell's longitudes were inaccurate and that for 48° W. one should read 58° W.—which tend towards showing that Morrell was off the coast south of Foyn Land.[§] Dr. Hugh Robert Mill, a dispassionate British writer, appears to endorse this side of the case, for he speaks of Morrell's North Cape of New South Greenland as being probably intended for Louis Philippe Land and Joinville Island.[‖] But it is certainly extremely significant that Dr. W. S. Bruce, the discoverer of Coats Land, who has been closer than anyone since Morrell to the position given by Morrell, should mark "New S. Greenland" on his latest chart.[¶] It seems as if there must have been some potent cause at work to influence such a reliable scientific observer as Dr. Bruce, and his opinion certainly carries far more weight than any one else's in this matter. If there is land in 48° W., 68° S., and it may be that Lieutenant Filchner will find some there, it should certainly be called Morrell Land. If not, it seems as though the coast south of Foyn Land should bear his name. Under the circumstances, it seems as if the nomenclature of these two spots should be held in abeyance until further exploration.

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[*] *Evening Post*, New York, Sept. 24, 1908. *Proceedings American Philosophical Society*, Vol. XLIII, 1909, p. 38. [†] *Antarctica*, pp. 200–201. [‡] *A Narrative of Four Voyages*, etc., 1832. [§] *Antarctica*, pp. 100–107. [‖] *The Siege of the South Pole*, pp. 109–110. [¶] *Polar Exploration*, 1911, p. 8.

Eastward of Joinville Island, Nordenskjold Land, etc., a great gulf or bay extends far south into Eastern West Antarctica. It was originally called George the IV Sea by its discoverer Weddell, but now that the reverence for King George IV appears to have vanished in Britain, geographic justice has prevailed, and on the suggestion of, I believe, Dr. Fricker, the portion of the ocean where Weddell made his plucky dash south is becoming known, as it should be, as the Weddell Sea.

The eastern boundary of Weddell Sea is also in Eastern West Antarctica, in the neighborhood of 20° W. The portion which has been sighted is known as Coats Land, a most suitable name and a well-deserved memorial for the gentlemen who helped finance Dr. Bruce's Scotch expedition. Curiously enough, Coats Land is located near to where Mr. Foxton reported that land had been found in 1833 by Lieutenant Binstead. Accepting Mr. Foxton as accurate, I wrote of this land in 1902 as Binstead-Foxton Land.* But Dr. Mill† states that the voyage referred to was really that of Biscoe and Rea, and that the land referred to was some fifty degrees of longitude distant from Coats Land. Biscoe, however, did not go on the voyage of Rea, when one of the latter's ships was crushed by the ice near the South Shetlands‡ and it is probably that voyage which Mr. Foxton had in mind.

From the western end of Palmer Land to the 180° meridian, that is along the western coasts of West Antarctica, almost all the names were given by six explorers, Bellingshausen, Biscoe, Dallmann, de Gerlache, Scott and Charcot. Almost all of their appellations should stand.

Contiguous to Palmer Land we find Danco Land, well named after de Gerlache's gallant companion who gave his life for exploration, and separated from the Castiglio Group, by the equally well named Gerlache Straits. Along the straits, and on the western sides of the Castiglio Islands, the names given by Biscoe, Dallmann, de

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*[*Antarctica*, p. 122.] †*The Siege of the South Pole*, p. 166. ‡*The Antarctic Manual*, 1901, p. 519.

Gerlache, and Charcot, with two or three exceptions or rather rectifications, must remain. Gerlache Strait itself was first indicated as a strait on Powell's chart. After that for many years, its northern end was charted as Hughes Gulf. It is possible that Smiley may have sailed through Gerlache Strait, but this remains uncertain. Dallmann next visited the southern entrance of these straits, which he called Bismarck Strait. Then came de Gerlache, who named the straits Belgica Strait, a name still occasionally used.* But de Gerlache's comrades, among them Frederick A. Cook and Roald Amundsen, afterwards changed this name to the much better one of Gerlache Strait, which will undoubtedly be finally accepted.

I do not know who gave the name Hughes Gulf to the northern end of Gerlache Strait, although it may have been a Captain Hoseason,† nor whom the name commemorated, but it should not be obliterated. Whilst it cannot remain attached to the body of water encompassed between Trinity Island, Palmer Land, and Liège Island, it might be transferred with fairness to the great bay separating Palmer Land and Danco Land, and called by de Gerlache, Brialmont Bay. I hope that this may be done, and that this bay may hereafter be known as Hughes Bay. The same thing should take place at the southern end of Gerlache Strait, which Dallmann called Bismarck Strait, a name still used by some German geographers.‡ This name will not do, for Dallmann did not sail through Gerlache Strait and did not prove that it was a strait. If such reasoning were followed, Gerlache Strait should be called Palmer Strait, since it is charted as a strait on Powell's chart. But following the precedent suggested for Hughes Bay at the northern entrance of Gerlache Strait, Dallmann's discovery might be commemorated at the southern entrance by remaining the great bay called by de Gerlache Flanders Bay, and naming this Bismarck Bay, or better still Dallmann Bay. The editor of *Stieler's Atlas of Modern Geography*, 1909, appears to be inclined to think much as I do, for he charts a bay in 65° 30′ S. as Bismarck Strait. This corresponds with Charcot's Beascochea Bay. But as Dallmann's discovery was certainly the south entrance of Gerlache Strait, where he must have looked into de Gerlache's Flanders Bay, it seems to me it is more accurate to mark Dallmann's discovery by changing that name into Dallman Bay.

Another important rectification is the name of the strait between

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* Stieler: *Atlas of Modern Geography*, 1906. † *Antarctica*, p. 114.

‡ Andree: *Allgemeines Handatlas: Herausgegeben von A. Scobel*, 1906.

Brabant and Anvers Isalnds. Originally charted from the west as a bay by Dallmann, and called Dallmann Bay, it was afterwards named Schollaert Strait by de Gerlache. This name should certainly be dropped, and the strait called after the gallant German explorer, Dallmann Strait.

From Dallmann Bay, in 65° S., to Matha Bay, in 66°30′ S., the coastal name is crystallizing into Graham Land. Graham Land was discovered before the year 1828 by Benjamin Pendleton, it was named by Biscoe, and it was explored by Charcot. At one time the name of Graham Land was the best known in West Antarctica, and this was undoubtedly due to the Mercator charts magnifying by leaps and bounds out of all proportion the size of the more southerly lands, across which the name Graham Land was printed in huge letters, so that it arrested forcibly the eye, and caused many persons to think it applied to the whole of Eastern West Antarctica.

During the voyage on which Pendleton discovered Graham Land, he sailed into a great bay or strait whose latitude he gives as 66° S. I charted such a bay tentatively in 1902 as Pendleton Bay, and on his recent voyage, Dr. Charcot sailed into a big bay in 66°15′ S., and fixed its name as Pendleton Bay. His courtesy will be much appreciated by Americans.

Off Graham Land, the Biscoe Islands; further south Adelaide Island, named by Biscoe; and Alexander Island, named by Bellingshausen; are all good names. So is Bellingshausen Sea, whose sponsor I do not know, for the great arm of the ocean between the Shetlands and Peter Island. The other names in this quarter are mainly those given by Charcot, such as Matha Bay, Marguerite Bay, Loubet Land, from 66°30′ S. to 68° S., and Fallières Land from 68° S. to 69°30′ S. Charcot Land, in 70° S., was really named by the writer, who has also suggested,* and who would like now to renew the suggestion, calling the straits between Adelaide Island and Loubet Land, Charcot Straits.

In the vicinity of Charcot Land, there is an island which has appeared at least once on a map under the name of "Smilies I." This is on a globe, manufactured by Gilman Joslin in Boston and copyrighted by Charles Copley in Washington in 1852, which is now in the Academy of Natural Sciences in Philadelphia. On this is charted "South Shetland," south of this in about 69°S′ "I. of Alexander," and south of this again, beyond 71° S., "Smilies I." It is impossible to identify this island. Smiley is known to have gone far south, but how far cannot be determined. In fact Smiley's own statements are incomprehensible. In a letter to Maury he said he had sailed round Palmer Land and far south of it, and that might be held to imply that he had been beyond Fallières Land. Wilkes, however, states that Smiley wrote to him that Palmer Land consists of islands between which Smiley had entered, and that the passages are deep, narrow and dangerous: so it may be that Smiley was referring to the Castiglio Islands and that he sailed through parts of Gerlache Strait. But as Smiley also says in his letter to Maury, that he had no logs or books remaining which would be of use to Maury, the matter can never be cleared up, unless totally unexpected information should turn up.*

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* *Bulletin American Geographical Society*, Vol. XLII, 1911, p. 86.

One capital name, suggested, I believe, by Mr. Henryk Arctowski, is the Antarctic Andes for the great mountain range springing up in the South Shetlands and continuing to Fallières Land, where they disappear into the unknown. For these mountains appear to be geologically a continuation of the South American Cordilleras and the name Antarctic Andes suggests both their formation and their relation to the American continent. It may turn out that the Antarctic Andes extend to Amundsen Land and Victoria Land, but the geological formations of Eastern West Antarctica and Eastern East Antarctica appear, according to Dr. Nordenskjold, to be different. Further exploration alone will solve this great geographical problem.

Continuing westward we come to Peter Island, discovered by Bellingshausen. Then, in about 85° W., we pass the spot where de Gerlache struck the continental shelf in soundings: there must be land there to the south which must wait for a name. In about 107° W., there seems to be a gulf in the pack where James Cook in 1774 made his record latitude: this gulf Charcot is inclined to think permanent. Why not therefore call it Cook Gulf? Beyond this Charcot also struck, in about 120° W., the continental shelf, implying a still nameless land in the immediate south. Between 140° W. and 150° W., Cook is perhaps the only explorer who writes of having crossed the Antarctic Circle. Nevertheless, Edmund Fanning† reported an extensive bank of from 60 to 100 fathoms in depth between 66° S. and 69° S., to the westward of 140° W., which he thought may be connected with extensive land to the south. This may prove to be the continental shelf of Antarctica, and if it should turn out that this bank exists, it might well be called Fanning Bank. West and south of this comes Edward Land, where all the various names given by its discoverer Scott must be accepted: as will also doubtless be any affixed by Lieutenant Prestud and Lieutenant Shirase to their own discoveries.

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* *Antarctica*, pp. 186, 187.

† *Voyages*, pp. 476–477.

Between Edward Land and the South Pole, all the various nomenclature given by Amundsen, Axel Heiberg Glacier, Devil's Dancing Room, etc., will naturally be immediately accepted. The great area of land which Amundsen discovered, some 500 miles long, should, as already suggested by the writer,* certainly be called Amundsen Land. Some of this, bounding the Great Ice Barrier on the south and for some distance on the east, evidently forms part of the shore line of West Antarctica. There must, however, be a long stretch of unsighted coast, possibly several hundred miles long, between Amundsen Land and Edward Land, still awaiting a discoverer and a name. Haakon Plateau, for the ice cap round the Pole, within the circle of 89° S., is a good name, until geographers decide possibly that Amundsen Plateau might be better. Farther west than Edward Land and Amundsen Land, the names of Ross Sea, and of Great Ice Barrier, sometimes shortened into Ross Barrier, carry the nomenclature into the eastern hemisphere. The name Great Ice Barrier, which appears to have come about almost accidentally but naturally, is not only descriptive, but extremely individual.

In the eastern hemisphere the first discoveries were some semi-Antarctic islands, and these in time received the names of their discoverers, Bouvet, Marion, Crozet, and Kerguelen Islands, as was also the case later with Heard and McDonald Islands.

Starting at the meridian of Greenwich and working east no land has been sighted until 50° E., where Enderby Land, well named after Biscoe's employers, is reached. It is probable that Enderby Land is the edge of the continent. Benjamin Morrell† reported reaching 60°11′ S., 48°15′ E., which would be almost south of Enderby Land: but as Morrell's longitudes, as already mentioned, were probably wrong by some ten degrees, it may well be that he was in 38° 15′ E., instead of 48° 15′ E.: a possibility which appears to have been unnoticed as yet. Further exploration must be awaited to learn whether there is salt water at 69°11′ S., 38°15′ E., and whether Enderby Land is part of the continent. In about the same latitude as Enderby Land, Kemp Land, correctly named after its discoverer, is next reached in about 58° E. Beyond Kemp Land the icy pack has again baffled the efforts of navigators for a long distance. In about 70° E., however, Nares crossed the Antarctic circle, and sailed into a sort of gulf in the pack which may perhaps mean an indentation in the coast there. No name has been given to this as yet. But as the great Scotch oceanographer, Sir John Murray, was then on board the *Challenger,* it would seem appropriate to commemorate his services to Antarctic geography by naming this spot Murray Gulf. East of Murray Gulf, the coast of East Antarctica again remains unsighted until the land discovered by the Drygalski expedition between 92°30′ E. and 90° E. is reached. They named this land Kaiser Wilhelm II Land, a name shortened by Bruce into Wilhelm Land; and this name will doubtless remain for awhile, but in fifty or a hundred years it may be replaced by Drygalski Land. The mountain discovered there is most appropriately called the Gaussberg.

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* *Bulletin American Geographical Society*, Vol. XLIV, p. 165.

† *A Narrative of Four Voyages*, etc., p. 65.

Continuing east, the coast of East Antarctica extends from about 94° E. to about 153° E., somewhat south of the Antarctic Circle. This is where Lieutenant Charles Wilkes, U. S. N., made, in 1840, his immortal discoveries. For he recognized, one might almost say by the intuition of genius, that he was on the edge of a continent, instead of on that of a frozen ocean whose existence was then generally accepted. His discovery revolutionized all conceptions of the Antarctic and was the starting point of all our present ideas. He called this land The Antarctic Continent, but it soon began to appear on maps, most justly, as Wilkes Land. For the name Antarctic Continent inevitably had to be borne by the entire continental mass Wilkes first told the world of, and some geographers instinctively recognized that the portion sighted by Wilkes ought to bear his name, in commemoration of his great service to science.

Wilkes also christened a number of places on the coast of Wilkes Land, chiefly after various officers of the United States Exploring Expedition. From west to east, he gave the names of Termination Land, Repulse Bay, Knox's High Land, Budd's High Land, Totten's High Land, North's High Land, Porpoise Bay, Cape Carr, Piner Bay, Point Alden, Point Case, Disappointment Bay, Point Emmons, Peacock Bay, Cape Hudson, Reynolds' Peak, Eld's Peak, and Ringgold's Knoll. It would seem advisable to change a little the form of some of these names. Knox's High Land, Budd's High Land, Totten's High Land, and North's High Land, must be shortened into Knox Land, Budd Land, Totten Land and North Land. Cape Carr, Point Alden, Point Case, Point Emmons and Cape Hudson, which in each case imply land, must be changed into Carr Land, Alden Land, Case Land, Emmons Land, and Hudson Land. It is probable, however, that most of the lands discovered by Wilkes are a little further south than Wilkes charted them; for it is a well-known fact that distances in the Antarctic are almost always underestimated. This has already proved true of Carr Land and Termination Land, and it will doubtless prove true of Hudson Land. It may also turn out that the three small islands Wilkes thought he sighted, Reynold Peak, Eld Peak and Ringgold Knoll, were monster icebergs: but this is not proved as yet. Wilkes did not give any name to the rocks seen by Pinkney of the *Flying Fish* in 65°58′ S., 157°49′ E., and this omission should be rectified by christening them Pinkney Island.

Two points of Wilkes Land were sighted by other explorers than Wilkes and his companions. One is in about 128° E., and was discovered by John Balleny, who called it Sabrina Land, in memory of his second vessel, which was lost with all on board in the Antarctic seas. The other is in about 140° E., and was discovered by the great French navigator, Dumont d'Urville, who landed there and was the first to tread on solid rock in East Antarctica. He called this coast Adélie Land, and this name is probably too well fixed to alter it, as would be only just, to D'Urville Land. An ice barrier in about 134° E., formerly supposed to have been discovered by D'Urville and named by him Côte Clarie, was recently proved by Rear Admiral John E. Pillsbury to have been first sighted by Lieutenant Ringgold of Wilkes' expedition.*

The preliminary report of the Australasian Antarctic Expedition under Dr. Mawson† to Wilkes Land absolutely corroborates Wilkes. Wilkes Land evidently is located just where Wilkes said it was, only a little further south. Although the *Aurora* was a steamer, built for ice navigation, however, Captain Davis was unable to hug the shore as closely as did Wilkes in his undefended sailing ships. But Davis saw such innumerable monster icebergs and such tremendous stretches of barrier ice, that he proved definitely anew the continuity of the coast line of Wilkes Land somewhere along 67° S. Between Adélie Land and Carr Land, Davis discovered a great bay which he named Commonwealth Bay. Davis also located Carr Land about one degree south, and Termination Land about two degrees south, of Wilkes' positions for them. Totten Land Davis did not see, although his soundings in 340 fathoms and the immense collection of bergs he

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* *The National Geographic Magazine*, Vol. XXI, 1910, pp. 171–173.

† *The Geographical Journal*, Vol. XXXIX, 1912, pp. 482–486.

saw, prove that Totten Land is located also perhaps a degree or so to the south of Wilkes' position for it. The ice barrier, called by D'Urville Côte Clarie, was found by Davis, at least to some extent, broken up. As far as the nomenclature is concerned, therefore, Mawson and Davis' explorations bring out one fact preeminently, and that is that the name Wilkes Land, and all the names given by Wilkes to parts of Wilkes Land, must stand for all time.

Between Hudson Land, the 180th meridian, and the 89th parallel, almost all of the names given by Balleny, Ross, Borchgrevink, Scott and Shackleton, must be accepted. The Balleny Islands are well named after their discoverer, John Balleny. The nomenclature of South Victoria Land, from Cape North to the Commonwealth Range, is pretty well established. It is open to two or three suggestions. One is that the coast, in 69°50′ S., 163°20′ E., and 68°30′ S., 158°15′ E., sighted by Lieutenant Pennell of the *Terra Nova** does not appear to have been named as yet, and might well be called Pennell Land. Another suggestion, already made by the writer,† would be to call the coast discovered by Shackleton to the west of Cape North, Shackleton Land. British geographers, however, may perhaps prefer considering these coasts as parts of South Victoria Land. Ross Island, on account of Ross Island in West Antarctica, ought certainly to be renamed: and a good substitute would be Hooker Island. The name King Edward VII Plateau, given by Shackleton to the ice cap south of Victoria Land, must be held to apply to the portion of the ice cap between Victoria Land and Haakon Plateau. It might well be shortened into Edward Plateau and better still be changed to Shackleton Plateau. It is an excellent idea, since it enables accuracy in writing, to christen in such wise any parts of the ice cap reached. The entire plateau needs no especial name, as it must inevitably be spoken of as the Great Ice Cap of Antarctica.

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* *Geographical Journal*, 1911, Vol. XXXVII, p. 569.

† *Bulletin American Geographical Society*, 1910, Vol. XLII, p. 21.

FISHERIES

AN EXAMPLE OF THE ATTITUDE TOWARD RESOURCES

BY

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The attitude of a people toward their resources usually passes through four stages. At first, when population is scanty and resources in great abundance, men look upon their natural riches as unlimited in amount. Secondly, blinded by a seeming plenty, each community becomes recklessly prodigal in the use of its wealth. In the third place, as a result of long-continued waste there is a shortening of the supply in some one or more cases. This brings about a feeling of unrest and protest. Either immediate actual exhaustion threatens or timely Cassandra voices are sufficiently strong to bring about restrictive measures. Such measures seek to control the utilization of nature's gifts so as to conserve them. The final step is a concerted effort to replenish or restore the resource to its original abundance. In the United States there are many illustrations of the first three stages.

Our forests were considered so abundant as to be a positive detriment to spreading settlements. Natural gas was looked upon as arising from an unlimited reservoir in the earth's interior. New farms were to be had for the taking. As a result, lumber companies were allowed to slash their way unchecked through our forests with no thought except to cut the greatest amount of wood in the shortest time, regardless of injury to the forests or to the streams arising in the forests. Natural gas was allowed to escape into the air unused, or was transmitted in leaky, loose-jointed pipes to a city where it was burned continuously day and night. Farms have been single cropped until the soil fertility has been exhausted, or so carelessly plowed that the rains have washed the soil completely away. The growth of population, the advancing cost of living, the knowledge that multi-millionaires were being created by unrestricted private use of public wealth, and the actual dwindling of certain necessaries, called attention sharply to their limitation and the prevalent wastes. This condition gave rise to the conservation movement. But the movement is so recent in the United States that there has been, as yet, no adequate illustration of the complete restoration on land of those resources that lend themselves to replacement. To find a resource that has fully passed through all the four stages outlined above, we must leave the land and look in the sea. In fisheries we began with a great plenty which caused corresponding wastes. Then we had a period of uneasiness culminating in the cry for conservation. Finally has come a restoration of certain exhausted species.

PERIOD OF ABUNDANCE

In recounting the glories and possibilities of the new land he had discovered, Columbus laid emphasis upon the fish that abounded in its waters.* He claimed they would furnish a never failing supply of food. Similarly, a few years after Columbus, Cabot reported his discoveries to the King of England, and advanced as one of the reasons for considering his new found land of great importance the fact that the waters washing the continent teemed with fish. The English colony founded at Jamestown turned to the abundant supply of oysters and fish in the neighboring streams in periods of food shortage.† The Pilgrims in seeking permission from their King to found a colony in America based their claim on the fishing to be obtained of which wondrous tales had been brought home by whaling fleets.‡ Their colony was nearly as much a fishing venture as a seeking of religious liberty. As in the Virginia colony, the fish off their coast kept them alive when their harvest failed.§ Immigrants' letters were full of astonishment at the great quantity of fish in the waters of their new home. So plentiful were fish that they were considered poor food, fit only for servants or slaves. A gentleman would not eat fish until hunger forced him to it. Even the servants objected to eating too much fish. Apprentice indentures frequently bore a provision that an apprentice was not to be made to eat fish more than three times a week.|| Fish that are to-day valuable as sources of food were then used for fertilizer. The abundance of whales and cod was the very foundation of the Massachusetts colony.¶ The state has recognized this fact by suspending a great model of the cod above the desk of the Speaker of House of Representatives, a sight which always causes comment by tourists. Tales of plenty are not

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* Fishing Industry of United States. S. Brown Goode.

† Fishing Industries of United States. S. Brown Goode.

‡ History of Whaling Industry. Walter S. Tower. Political Economy and Public Law Series No. 20.

§ Fishing Industries, U. S. Goode.

|| Handbook. International Fisheries Exhibit. London, 1883.

¶ History, New England Fisheries. McFarland. D. Appleton & Co., 1911.

confined to the colonial period but extend to the days of our own fathers. Such a fish as the sturgeon was caught in so great numbers as to be piled on shore like railroad ties, to burn or to decay.* There are many records of fish jumping into the open boats of the fishermen. Everywhere, then, there were fish in great plenty in American waters.

THE PERIOD OF WASTE

The greatness of the resource in fish has been equalled by the reckless manner in which it has been utilized. Our fishing has been like primitive hunting. All thought has been on present gain without any regard for future supply. In fishing as in hunting, when one region or species was exhausted, it was easy to move to another. This has been a world experience, so is not limited to United States. Ages ago, at the annual overflow of the Nile many fish were stranded. The Egyptians gathered only the largest fish for food, leaving the smaller ones on the banks to die. It was not long before there was a noticeable decrease in the number of fish in the Nile. There were no longer large fish in the receding waters. Then the Egyptians tried throwing the formerly despised little fish back in the river, an expedient which was successful in restocking the stream.†

In Greece also a species of fish like our mackerel, called "thunnier" by the natives, were driven into bays and lagoons in great numbers and there killed with sticks. Greece won fame as a fishing center, but shortly her waters were so depleted that fishermen had to seek elsewhere for their prey.‡

The shallow waters of the British Isles and the numerous estuaries that once abounded in fish have been so exhausted that fishing boats now have to go far from land for their hauls.

There are several reasons for over-fishing. In the first place man cannot resist gorging in the face of plenty. When there is more than enough, men take more than they need. Abundance breeds the idea that abundance will always prevail, so carelessness creeps in. When fish are plentiful they are cheap; in order to make a profit the fisherman must take large quantities. They cannot afford the time and care necessary to prevent waste. Attention is centered on making money quickly. As the supply of fish begins to dwindle the price rises, so men become more and more eager for large catches. The difference in price offsets wastes, so no attention is paid to preventable losses until some outside force compels more careful methods. The outside force may be legal governmental restrictions or it may be the exhaustion of the supply of fish.

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* Unparalleled Extermination of a Species. The Sturgeon. W. S. Tower. Popular Science Monthly, October, 1908.

† Fisheries and Fishes of All Nations. W. M. Adams. London Handbook, 1883.

‡ W. M. Adams. Fisheries and Fishes of All Nations. London Handbook, 1883. Great International Fisheries Exhibition.

There are many examples in the fish family of members once plentiful reduced to a few. Among them are the lobsters, shad, and oysters. Lobsters are taken to illustrate the working of the law of extermination in the sea. Shad, salmon and sturgeon show the same process at work in rivers, and oysters prove that bays are not exempt from man's aggressive greed.

(A) THE LOBSTER*

Lobsters were once abundant all along the Atlantic coast from Delaware Bay to Labrador. The chief centers, however, were off the coasts of Maine and Nova Scotia, because the lobster prefers cool water, and a rocky bottom, where there is a greater likelihood of food. The lobster is the goat of the sea, eating anything, alive or dead, vegetable or animal. In the Maine region lobster catching has been an important business for more than a century. Catches have been enormous, amounting in 1889 to 30,000,000 pounds.† The lobsters, too, were of large size—often attaining twenty pounds apiece, and sometimes as high as forty pounds—a contrast to our present two pounders. The delicate flavor, so widely popular, the ease of catching and the great numbers caused lobstering to be conducted on a large scale. The lobster was able to resist its natural enemies, but when man was added, the fight for existence was too unequal and almost total extermination took place. The female does not produce eggs until she is three or four years old, and then produces only at two-year periods. After the eggs are extruded from the body they are carried for nearly eleven months in the tail of the female. With such a precarious existence it is surprising that lobsters survive at all, but nature has adjusted a nice balance between reproduction and extermination. When man appears as an enemy he upsets nature's balance. He takes all kinds of lobsters, large and small, male and female, with or without eggs; so it is only a question of time when lobsters cease to exist. The 30,000,000 pounds taken in 1889 shrank to 15,000,000 in 1898† and continued to decline until recently, when artificially propagated lobsters began to appear in the catches. As the quantity of lobsters declined, the price per pound went up. In 1880, lobsters sold for 3.6 cents per pound.

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* Reports, U. S. Fish Commission. Ency. Britannica. New International Ency. Fishing Industries, U. S. S. Brown Goode.

† Statistical Abstract of U. S.

In 1898 the price was 8.7 cents and in 1908 it had reached 12 cents.* So as man's operation began to show in a declining supply the search for lobsters became more and more keen. Protective laws were flagrantly violated in order to supply the hotels and the homes of the rich with the delicacy they demanded. The lobsters were in danger of utter annihilation. The efforts to prevent extermination are told later in this paper.

(B) THE SHAD

There is a group of fish,—called anadromous—that begins life in a river, goes out to sea to live and returns to the river to spawn. To this family belong the salmon and the shad. The story of the river-seeking shad is similar to that of the sea-dwelling lobster.

The shad, at one time, ran in all the Atlantic rivers from the Gulf of St. Lawrence to Florida, but chiefly in Chesapeake Bay and its tributaries and in the Delaware, Connecticut and Kennebec.† An allied species ascended the Mississippi River as far as the Ohio. They were also found in the streams discharging into the Gulf of Mexico.† Shad were so plentiful that only the poorest people ate them. They were used principally for fertilizer. Their chief value lay in the fact that as the young shad made their way from the river to the sea they attracted inshore the deep sea cod and halibut, thus avoiding the necessity for long sea voyages to catch the latter. As population increased and pressure upon food resources became greater, the shad were used for food. Since the shad forced their way up the river in great schools to spawn, their capture was easy. Every wholesale catching device was used. Nets and other obstructions were stretched across the rivers, especially near the river mouth. On the Potomac one net took 3,600 fish at a single haul.‡ One seine net caught 11,000 shad in a week on the Roanoke River in 1895.§

In each of the chief rivers the average daily haul was never less than 3,000 fish. Explosives to stun and kill the fish added to the catches by net.‖ Very few fish reached the spawning grounds. The offspring of the few which did survive had a hard struggle to live. Many of the streams in which shad ran were used to dispose of the sewage of surrounding towns. The water thus polluted poisoned the young shad.¶ Saw mills emptied their dust into the streams. This caught in the gills of the fish, suffocating and poisoning them.**

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* Statistical Abstract, United States.

† Communication Commissioner Fisheries, 1912.

‡ U. S. Bureau Fisheries. An article by Hugh Smith, pub. by the dept. for the International Fisheries Congress in 1908.

§ Shad Fisheries of Atlantic Coast. U. S. Fisheries Bureau.

‖ Report Maine Fish Commission, 1906.

¶ Report Penna. Fish Commission, 1906.

** Report Maine Fish Commission, 1903-04.

Farming operations on the banks of the streams so muddied the waters that the young fish were choked.* So it was a lucky fish that escaped to sea with its life. As railway building extended markets, as better methods of canning were adopted and as uses were found for former waste products, the tackle and methods of catching the shad were vastly improved.† Since all the fish were taken before or during the spawning season, few reached the spawning grounds. Added to all the other agents of destruction was the obstructing of streams with dams to develop water power. It is no wonder that the run of shad in some rivers ceased altogether, and in all rivers was greatly decreased. The Connecticut rivermen used to sell 500,000 shad a year. To-day they sell considerably less than 50,000.‡ The efforts to restore the shad fishery belong properly to another section of this paper.

(c) THE OYSTER§

The denizens of the sea have suffered at man's hands, the residents of the river have been nearly exterminated by him. The humble dwellers in the bays have not escaped. The oyster can be found all along the Atlantic coast from Texas to Massachusetts. Its real home, however, is in Chesapeake Bay with Baltimore as the largest canning and shipping center. Special trains running on the schedule of the fastest expresses carry oysters nightly from Baltimore to Chicago and St. Louis. Man has been the oyster's most dangerous enemy, for in his haste to make large profits man has taken away from the beds all kinds of oysters, large and small. Not enough are left to perpetuate the stock. An oyster grows an inch or more a year until about four years old, then grows more slowly. They should not be taken from the beds until the maximum size is reached. Enough oysters should in any case be left to carry on reproduction, and to provide fastenings for the young oysters. As in forests, the amount taken away each year should not be more than the growth for that year. But man has too frequently taken all the oysters from a given bed. So extensive was this practice that the danger of annihilation was serious. Only the work of states and especially of the United States Fish Commission has prevented this calamity.

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* Shad Fisheries of the Atlantic Coast. Bureau Fisheries. † Fisheries of U. S. S. Brown Goode.

‡ Statistical Abstract, U. S. § Oysters and Methods Oyster Culture. H. F. Moore. U. S. Fish Comm.; Condition and Extent of Natural Oyster Beds of Delaware, Doc. 745; Oyster Culture Experiments in Louisiana, Doc. 731; Condition and Extent Oyster Beds James River, Doc. 729; Volumetric Studies of Food and Feeding Oysters. Bureau Fisheries.

CONSERVATION*

About the middle of the last century, much uneasiness was felt concerning the wholesale destruction of our fish. The States first tried to prevent some of the waste by legislation. Fines were imposed for taking fish under certain size, with eggs, or at certain seasons of the year. These laws were not very effective, because they were too easy to evade. The unrest finally crystalized in an Association of those most interested in fisheries. Through the efforts of this Association, Congress in 1871 created the United States Fisheries Commission. The Commission's first work was an investigation of all commercial fish along the Atlantic coast and Great Lakes. The study was thorough. All the factors concerning fish were investigated, the habits of the fish, its enemies and friends, the effect of currents and temperature, the migration habits and causes for migration, the methods of reproduction and growth. A study was made of fishing grounds so as to extend fish resources, and obtain greater yields with better conditions. Types of vessels and fishing gear were carefully tested so as to recommend ways of avoiding wastes. Experiments were made with the various parts of the fish so as to make as much as possible salable and as little as possible waste material. Methods of transporting, canning and preserving fish were investigated so as to cut down loss. Foreign experience was drawn upon to help solve domestic problems. Finally, a fish pathologist has been employed to study the cause and cure of diseases in fish. The work has been carried on by the Commission itself, by experts it has called in from time to time, and by volunteer scientists. The examples chosen for this paper, the lobster, shad and oyster were among the earliest to be thoroughly investigated in the ways outlined.

RESTORATION

At first the United States Fish Commission was an investigating body purely, but the second year of its existence it was authorized to propagate fish. This has since been the largest part of its work. Eggs that would otherwise be lost are taken from fish caught for market and hatched at the government hatcheries. The fish hatched from the eggs are first made to replenish streams or waters from which the eggs came. Then the various State Commissions receive supplies of eggs. Finally, private individuals, through their Senators or Representatives, may obtain fish to stock private or public waters.

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*Work of U. S. Fish Commission. S. B. Goode. London Handbook. Bureau of Fisheries; Hugh Smith. *Nat. Geog. Mag.*

Before man's interference nature had adjusted the reproduction of fish to their extermination by natural enemies. When man was added as an enemy he upset the balance and so nearly exterminated the fish. Now in the capacity of friend, man is going to the other extreme in his efforts to replenish the fish supply. He offsets the natural enemies. The most dangerous period for any fish is during the earliest stages of its life. In the case of the lobster, as soon as the eggs are hatched, the young spend their first three months swimming as larvæ on the surface of the water. At this period they are devoured in countless numbers by surface swimming fish. At the end of the larvæ span the young lobster sinks to the bottom of the sea, and becomes the prey of every ground feeding fish. In periods of stress, even the adult members of its own family eat it, for lobsters are atrocious cannibals. During the first year the lobster molts or changes its shell seventeen or eighteen times. Each molting is a dangerous period and the mortality at such times is high. During the body change the lobster is without its natural hard shell protective covering and so is peculiarly defenseless. Artificial reproduction saves young lobsters from many of these vicissitudes. There are no natural enemies in the tanks of the hatcheries. Even the molting stages are carefully guarded, so a lobster that begins life under artificial conditions has a far greater chance of surviving than if hatched naturally. Lobsters are not planted until their most dangerous period is over, and they are able to meet natural enemies, well protected.

Similarly it is better for a shad to start life in a tank than in a river. Shad do not copulate. The female sheds spawn into the water and the male extrudes milt. If these two meet the eggs are fertilized. There is much loss of eggs by failure of the spawn and milt to intermingle. Spawn and milt are also eaten by other fish and by insects. Under artificial conditions the mingling can be controlled and so there is surety of the eggs being fertilized. Insects can be screened. In the river, if the eggs are fertilized, they sink to the bottom where eels devour them in quantities. Floods and receding waters destroy countless eggs. After hatching, muskrats and larger fish prey upon the infant shad, and at the river mouth, cod and haddock hungrily await their coming. In the hatcheries there are no eels, no muskrats, no fish enemies, no floods and no receding waters, so young shad hatched artificially do not have to run the long gauntlet that their relatives of the river must pass in order to live. So the number of shad that reach the planting size is much greater under hatchery conditions than under ordinary conditions. Man then is a benefit to the fish by protecting it from a host of enemies during infancy, when it is most likely to lose its life. Before 1880 shad decreased in every river along the coast. Artificial propagation has stopped the decrease, and in spite of more efficient fishing gear, shad are once more so abundant that there is no species of fish more important to residents of the entire Atlantic seaboard.*

Especially equipped tank cars, six in number, are used to transport young fish wherever railroads go, and large cans, like those used for milk, carry the fish from the railway station to the place of planting. Sea work is done by a large vessel, the *Albatross*. For inland or river work the *Fishhawk*, a small boat, is used. The Commission owns several still smaller craft.

Hatcheries have been established at points where special fish were being exterminated. For several years lobsters have been systematically hatched and planted along the Maine coast. This artificial propagation is just beginning to show in the catches. Fishermen report more and more numerous young lobsters; so the tide of annihilation has been turned and soon artificial reproduction may overtake consumption. Man will then have restored the balance of nature which he had so rudely upset. Shad have been kept running by establishing hatcheries near streams that long ago would have been fished out, if left to natural results. Shad were introduced on the Pacific coast in 1885. The cost of planting was $4,000. The annual net return is $330,000 to-day, so that one experiment at least is paying a handsome dividend. Ever since 1867 artificial reproduction has kept shad running in the Connecticut River. Shad have been planted in Atlantic coast rivers by the billions.

The result of investigating the oyster industry has been to cause the various States most concerned to pass laws regulating the beds, the size and number of oysters to be taken, and the policing of the beds. Oyster preservation and propagation differs from lobsters and shad in that oysters are not hatched from eggs away from their natural habitat. We have no oyster hatcheries. Results similar to those obtained for other fish at hatcheries are provided for oysters by better care of the beds.

Young oysters are minute larvæ that swim on the surface of the sea. Menhaden, alewives, mackerel and other surface swimming fish feed on them at this stage. Soon the young oyster sinks to the bottom of the sea and attaches itself to some object which must be clean and remain long enough for the oyster to become fixed. When food is plentiful the oyster grows rapidly and assumes a convex shape on the left side and flat on the right. Shape determines market value. Under natural conditions young oysters fasten themselves in too great numbers on the same object, crowding and killing each other as they grow. Oysters feed on minute plants and animals (even their own young) in the water. Such plants are more abundant in shallow muddy water, so the best bottom is one that is firm enough for oysters to attach themselves but must also be near a muddy section, in water not too deep to be readily warmed in the sun. Too finely divided mud, or a moving sand bottom, overwhelms the tiny oyster, suffocating it. A rocky bottom is too deficient in food. The water must not be stagnant, must not be subject to frequent flood, which dislodges the oyster, and must not be too fresh. Too much ice discolors the oyster. So the muddy bottom must be saline and influenced by tides or current to aerate the water and bring in food.

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* Shad Fisheries of Atlantic Coast. U. S. Fisheries Bureau.

Oysters have sex, reproducing like fish. The male sends milt into the water, the female, eggs. If the two genital fluids mix the eggs are fertilized, but since the oyster spawn over a long period (April-October) and as the oysters are often scattered widely over the natural beds and because there is no way of determining sex before spawning, there is great loss of eggs, for the two fluids do not meet at all or not soon enough.

The oyster has enemies both active and passive. The passive enemies are parasites which grow so rapidly as to engulf the oyster; or are other similar shell animals which eat all the oyster's food. The active enemies are boring worms which eat out the oyster's shell. Drills with their rasp tongues penetrate the shell and suck out the oyster. Drumfish, stingray, and worst of all, the star-fish eat oysters. The star-fish encircles the oyster and by muscular effort pulls the shells apart to eat the soft parts.

Man has helped the oyster by increasing the areas available for fixation by planting brush, tin cans, shells, bricks and pieces of pottery and sand in soft, muddy bottoms. By preventing crowding, breaking up clusters, many young are saved and allowed to grow into market shape. Seed oysters are planted at regular intervals over the bottom so as to assure a mixture of eggs and milt. Enemies are destroyed by fishing for them, dragging traps across the beds to catch them and by building stockades to keep the fish enemies away from the beds. Food supply has been increased by propagating the small plants which constitute 90 per cent. of what the oysters eat. Finally legal provisions are made that prevent the taking of immature oysters from the beds, or the removal of more than the natural increment in any one year. By these means extermination is prevented and a supply sufficient for the always increasing demand is made. The threatened annihilation of the oyster is thus stayed.

As the fish along the Nile were wasted by the receding waters, so along the Mississippi after floods thousands of stranded fish formerly perished. To-day these fish are collected and put back in the river or sent to stock some other station. The same class of rescue work is carried on along canals that are drained in the fall of the year. Fish alien to our waters have been introduced here.

Stress has been laid on the work of the National Commission (now the Bureau of Fisheries) because its work has been the most comprehensive. Various State Commissions have carried on similar works for their own waters, meeting the problems peculiar to their State. The State and national bureaus are interdependent, aiding and supplementing each other. States having mutual waterways, such as New Jersey and Pennsylvania, New Jersey and New York, Pennsylvania and Ohio, consult each other as to fish legislation and aid each other in fish hatching and preservation.

The oyster, the cod, the shad, the salmon and the lobster, our valuable food fishes, would soon cease to exist if the work of artificial propagation and egg hatching were not carried on by the State and National Commissions.

The fish industry employs 150,000 men and the annual value of its products is over $50,000,000.* It is taken as an illustration of the attitude toward all resources, because it so well shows all the phases through which resources pass. In regard to some of our resources we are still in the first stage. Others we are wasting thoughtlessly. Toward many we are getting uneasy and preaching conservation, but in none except fisheries have we actually taken the last step and regenerated a resource that had been lost. For this reason, fisheries are here used to illustrate the whole field.

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*Statistical Abstract U. S.

A GEOGRAPHIC STUDY OF THE MESA VERDE*

BY

WALLACE W. ATWOOD

About thirty-five miles southwest from the base of the San Juan Mountains and near the southwestern corner of Colorado there is a maturely dissected mesa, bordered by an abrupt escarpment, which rises from one thousand to two thousand feet above the adjoining lowland. The upland area is of sufficient elevation to receive an annual rainfall which will support a covering of grass and a scattering of scrubby cedars and piñons, and thus the name Mesa Verde, a green table, was long ago suggested.

The Origin of the Mesa Verde.—In origin the mesa is closely related to the geomorphic changes which have affected the San Juan region of southwestern Colorado, and the details in the outline of the mesa, in the bordering escarpments, and in the canyons which subdivide the mesa, are dependent upon local geologic conditions. The Mesa Verde is but a portion of a widespread plateau, which has been dissected by streams flowing southward and southwestward from the San Juan Mountains into the San Juan River, and thence to the Colorado. The mesa and plateau surfaces appear to be portions of a late Tertiary peneplain. That peneplain probably extended northeastward over a portion of the neighboring areas where now there are mountain ranges, and far to the southwest over the Colorado Plateau district. The relationship of the surface of the mesa to the San Juan Mountains is strongly suggested by a scattering of beautifully worn gravels, which must have come from the San Juan Mountains and travelled southwestward in stream courses long before the present valleys were developed. With the uplift which closed the cycle of erosion, when this broad area was reduced to a peneplain, the San Juan Mountain area rose as a dome and the surrounding area as a slightly inclined plain. The upper surface of the Mesa Verde slopes gently to the southwest. The streams were invigorated and the uplifted and deformed peneplain was dissected. The areas of softer rocks were first reduced and the remaining upland areas were thus defined as relief features. These relief features have been slowly yielding to the agencies of weathering and stream erosion to the present time.

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* From *Annals of the Assoc. of Amer. Geographers*, Vol. 1, pp. 95–100, Plates VI–VIII.

The Dissection of the Mesa.—A hard layer of sandstone has preserved portions of the Mesa Verde, and the weathering of soft underlying shales has maintained the precipitous marginal escarpment. On the north, east, and south are the valleys of the Rio Mancos and its tributaries. On the west is the Montezuma Valley. The smaller streams tributary to the Rio Mancos on the south side of the mesa have worked headward until, in some instances, they have reached the escarpments bordering the mesa on the north and northwest. These escarpments, in turn, have been gradually retreating southward as the soft shales have been worn away, and huge blocks of the hard, overlying sandstone have fallen. In those instances where the headward growth of the valleys has reached to the margin of the mesa, the upper ends of the valleys are being gradually cut off by the retreat of the marginal escarpment. The surface of the mesa is to-day, therefore, very little like a tableland, for the canyons, which have been cut into it have left but narrow strips of upland bordered on either side by the nearly vertical faces of the canyon wall. As there is little or no water on the mesa at present, it is more common to see the stream courses dry than to find flowing water in them. The heads of the canyons are box-like, and the waters enter them as cascades or falls. The extension of the canyons northward into the mesa must be by the under-cutting at the falls and the gradual recession of the falls up stream.

The Cliff Dwellers of the Mesa.—The mesa top suggested to certain primitive people who formerly lived in the southwestern portion of the United States, an easily protected site for their homes. The upland could be reached only at a few points, and at those points with great difficulty. The approach of unfriendly peoples could be watched from the rim of the mesa or from outlook points on the rims of the canyons, and attempts made to scale the bordering escarpments or approach the homes through the canyons from the south could be anticipated by the dwellers on the mesa or by those in the great alcoves near the heads of the canyons. These people became the Cliff Dwellers. They built some of their homes and many watch towers on the remnants of the upland surface of the mesa, but most of their houses were built in the canyon walls. The ruins of these homes may still be found to the number of several hundred, scattered about through the area now set aside as the

Mesa Verde National Park and southward over the remaining portion of the Mesa Verde. The more remarkable of the buildings are near the heads of certain of the canyons which end just south of the southern limit of the Park. The Park authorities, however, by an act of Congress, have been given control over this region of unusual dwellings which added to the territory under their jurisdiction a bordering strip five miles in width. The alcoves which were selected for homes were worn out of the canyon walls by the agents of weathering at less resistant points in the sandstones. The dwellings are not in the underlying soft shales, but near the bedding plane between two of the great sandstone layers which form the capping of the mesa. The overhanging ledge sometimes extends as much as one hundred feet beyond the inner margin of the cave in which the home was built.

The Character of the Houses.—Fragments of the sandstone, after some little trimming and shaping, were used by these peoples in the construction of their homes and laid one upon the other with mortar or plaster made of the underlying clay. The homes were built from the floor of the cave to the ceiling. In some instances there are three, and in a few instances even four stories. The floors were made by placing cedar boughs from wall to wall. These cedar boughs were usually allowed to protrude beyond the walls and sometimes served as a support for platforms or balconies. The rooms are usually not more than eight or ten feet in diameter and many of them are much less than that. Many of them are without light from the outside. The dark rooms have been interpreted as granaries or storage rooms.

A few of the inner rooms in which human bones, and in some instances mummies have been found, have been interpreted as burial rooms, and it is believed that these people, after embalming their dead, stored them away in the inner recesses of their great dwellings. Among the rooms in the dwellings there are certain circular ones which have been called kivas, and these have been interpreted as ceremonial rooms. These rooms were covered over and entered from above by ladders, or through subterranean passageways. The kivas had cold air flues for ventilation, an altar, a large central fireplace, small niches in which the sacred grain was stored, and a little off the center a small circular opening about eight inches deep and four inches in diameter, which has been interpreted as a connection with the under-world which might be used when desired by those conducting the sacred services. The ceremonial rooms were sometimes rectangular; they were always well made and exceedingly strong. There were several such kivas in each dwelling and they were always in the outer portion or foreground of the little village.

The Products and Implements of the Cliff Dwellers.—Almost every room in the dwellings has been blackened by the soot which came from the fires used for heating or cooking. There were open fireplaces in which the people prepared their simple foods and about which they may have baked certain of the pieces of pottery. Scattered about in the rooms and in the large open space back of the rooms, where the caves have but little height, there are thousands and thousands of corncobs. Great heaps of corncobs have been found by those who have been engaged in repairing the dwellings. The corncobs were small, about the size of pop corn cobs, and it is of special interest to learn that these people raised maize in this region where now there is but one spring known, and where it would be impossible to raise grain without some elaborate method of storing the rainfall and using it through the dry season by means of irrigation ditches.

From the few relics found about the dwellings it is evident that cotton also was raised. Some game was killed, and both the cotton and the skins of animals were used for clothing. The leaves of the corn, and the leaves and cords of the yucca served in the making of sandals. The abundance of plastic clays and the necessity of vessels for carrying water led these people to be good pottery makers, and among the dwellings to-day there are many bits of ancient pottery. Occasionally a bowl or a spoon or a cup is found in the débris.

The corn was ground in large bowl-shaped stones, hollowed out for that purpose. Many of the grinding stones and bowls are still in good condition and are now preserved for the inspection of visitors. About the ruins little flint arrow-heads, used presumably for shooting small game, may be found, and at many places on the upland areas of the mesa similar arrow-heads have been picked up. Stone axes and stone knives have also been found, but no implements of metal. The Cliff Dwellers, used the grasses and leaves of the yucca, the leaves of the corn, the twigs from the willows, cedar boughs and trunks, stones, clay, cotton and the skins of wild animals. They presumably lived in peace and in an exceedingly simple way.

The Cliff Palace.—In the largest of the dwellings, the Cliff Palace, there are over 300 rooms. A great circular tower occupies the central position in the dwelling, and at one end is a rectangular tower, four stories high, interpreted as the home of the chief. Over twenty kivas border this dwelling in the foreground, and behind the rooms which were closed in there is a large open space which may have been used as a playground for children or a safe retreat during an attack, or as general storage space.

Near each dwelling on the mesa there must have been a spring. There are indications that many such springs did exist. The one which is now flowing is near the head of one of the forks of the Navajo Canyon, where the Spruce Tree House is located. The dwellings at the Spruce Tree House and Cliff Palace have been somewhat repaired by representatives of the Smithsonian Institution, but this work has been so well done that the homes still appear as ruins. The débris has been cleared away and a much better idea of these ancient homes can now be obtained than before this work was done. There remain several of the dwellings which are almost inaccessible or unsafe to visit until some work of repair shall have been done.

The Geographic Conditions at the Time of Occupation by the Cliff Dwellers.—The origin of the mesa is seen to have been closely associated with the physiographic history of the region. Its form and the details in its architecture are due to the controlling geologic conditions. Its isolation made it attractive to a peaceful people who wished a quiet home out of the reach of unfriendly nomadic tribes. The alcoves which the Cliff Dwellers selected for their homes were due to the differential weathering of the varying formations of the mesa. The stones used in building homes were obtained from the formation immediately at hand; the clay used as mortar immediately underlay the sandstone. The scarcity of water determined the location of the homes near the springs, and compelled the people to conserve the water supply. The necessity for carrying and conserving their water supply led these people to make various kinds of water vessels and to become good pottery makers. The scarcity of level land made it necessary to cultivate small portions on the upland and on the canyon bottoms. The aridity of the climate made the food supply a difficult question for these people. The corn which they raised was small and stunted. The wild game was presumably small and scarce. Cotton was raised in but relatively small quantities.

The Present Conditions.—Since the Cliff Dwellers inhabited the Mesa Verde, the climate has evidently become even more arid, and the mesa could not to-day support the population which it must once have supported. The single spring would limit the inhabitants to one or at most two of the hundreds of dwellings scattered about on the mesa and in the canyons. The almost complete absence of wild game on the mesa would add to the difficulties.

The Age of the Ruins.—The lack of definite legends, among the Indian tribes of the Southwest of their relationship to these ancient Cliff Dwellers seems to indicate that these homes were deserted many hundreds of years ago, and the absence of any metals about the homes suggests the same conclusion. The relationship of this entire record to the geologic history suggests that the Cliff Dwellers inhabited this region at a time much less removed than the present from the last period of glaciation in the mountains, and the question may perhaps be raised, may we not find some evidence in the homes of these ancient peoples that will indicate that they inhabited portions of our Southwest country during the last glacial epoch in North America?

STUDIES ON CLIMATE AND CROPS*

3. THE "SOLAR CONSTANT" AND THE VARIATIONS OF ATMOSPHERIC TEMPERATURE AT AREQUIPA AND SOME OTHER STATIONS

BY

HENRYK ARCTOWSKI

At my request, Prof. E. C. Pickering kindly let me utilize for my researches on Climate and Crops the not yet published observations made at Arequipa during the years 1900-1910. As these observations interest meteorologists greatly (South American data being very scarce and not easily obtainable), I shall begin this paper by a summary of the results of my calculations.

The Arequipa station has been described previously in the *Annals* of Harvard Observatory.† The installation of the thermometers has undergone no change during the eleven years taken into consideration. The instruments were observed at 8 A. M., 2 and 8 P. M. The daily maxima and minima were also recorded. Some gaps occurring here and there were not important enough to affect the averages, except in the case of the 2 o'clock observation during the month of March 1908. The adopted value 64°.1 is therefore more or less hypothetical. The daily minima are also lacking from April 8th, 1909, till March 7th, 1910.

The lowest temperature, 36° F., was recorded in Aug. 1908 and the highest, 78° F., in June 1910.

The annual maxima are 74° or 75°, except in 1909 and 1910, when they were 76° and 78°. The lowest maximum recorded is 68° (Jan. 1904). This small difference, of only 10° between the extreme values of monthly maxima, explains why the annual maximum may occur at any time of the year. The highest yearly minimum, 42°, was observed in 1901.

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* Paper 1 in this series appeared in *The Bulletin*, Vol. 42, 1910, pp. 270–282; Paper 2 in the same volume, pp. 481–495.

† *Annals of the Astronomical Observatory of Harvard College*, Vol. 39. Cambridge, Mass., 1899.

Table 1 gives the mean maxima and minima and also their differences for each year.

TABLE 1.

YEAR	MEAN MAX.	MEAN MIN.	DIFF.	FEB'Y	JULY
1900....	68.73	49.59	19.14	16.6	19.0
1901....	68.20	48.90	19.30	18.1	19.5
1902....	68.06	49.02	19.04	16.7	19.3
1903....	67.52	47.88	19.64	18.9	19.1
1904....	67.02	47.20	19.82	19.7	20.1
1905....	68.18	48.45	19.73	20.0	19.6
1906....	67.73	47.07	19.76	19.4	19.5
1907....	66.76	48.69	18.07	14.9	18.3
1908....	67.06	48.27	18.79	16.5	19.3
1909....	66.80	....			
1910...	66.46	....			
Mean differences =			19.25	17.9	19.3

TABLE 2.

YEAR	8 A. M.	2 P. M.	8 P. M.	DIFF. 1	DIFF. 2
1900....	60.10	66.66	54.02	6.56	12.64
1901....	59.57	66.28	53.45	6.71	12.83
1902....	59.34	66.36	53.53	7.02	12.83
1903....	59.31	65.57	52.92	6.26	12.65
1904....	58.53	65.52	52.03	6.99	13.49
1905....	59.62	66.38	53.33	6.76	13.05
1906....	59.03	66.09	52.71	7.06	13.38
1907....	58.38	64.71	52.86	6.33	11.85
1908....	58.78	65.00	52.79	6.22	12.21
1909....	58.32	65.17	51.87	6.85	13.30
1910....	58.09	64.28	52.32	6.19	11.96
Mean	59.01	65.64	52.89		

The mean difference, 19°.25, expresses the range of the daily variation slightly exaggerated.

More information on the daily variation can be obtained from Table 2, which gives the mean temperatures for the hours 8 A. M., 2 and 8 P. M.

I give these figures for each year as it is interesting to compare the differences 2 P. M.–8 A. M. (Diff. 1) and 2 P. M.–8 P. M. (Diff. 2) from year to year, with those of other stations as I have done in the case of Russian data.*

Table 3 contains the monthly means, which have been calculated according to the formula (8+2+8+8)÷4, to make them correspond to those of the maxima and minima.

TABLE 3.

STATION—AREQUIPA. DATA—MEAN TEMPERATURES.

YEAR	JAN.	FEB.	MAR.	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	MEAN
1900........	58.5	59.3	60.2	59.6	57.7	57.3	56.0	58.4	58.8	59.4	59.5	59.6	58 69
1901........	59.1	59.4	58.0	58.7	58.1	55.9	56.0	58.3	59.4	58.4	57.8	59.0	58.17
1902........	58.3	57.5	57.7	58.5	58.2	56.0	57.6	57.6	58.8	58.9	59 2	59.7	58.17
1903........	60.4	61.8	58.7	57.2	56.8	55.5	56.3	56.0	58.6	58.2	56.3	56.6	57.70
1904........	57.0	57.2	56.3	57.2	55.6	56.0	55.0	57.3	57.9	57.5	58.8	58.4	57.02
1905....... .	58.2	59.5	57.0	58.2	58.1	57.8	56.9	57.7	58.0	59.6	58.7	58.2	58.16
1906........	59.1	58.8	58.9	59.2	57.7	55.0	55.2	56.6	58.7	57.1	58.3	56.7	57.61
1907........	56.3	55.4	58.1	56.6	57.1	56.3	55.8	57.0	58.3	58.1	58.6	58.5	57.17
1908........	58.5	57.4	(58.1)	58.2	57.5	56.8	55.5	58.3	57.5	56.9	57.9	57.4	57.50
1909........	57.2	56.4	58.7	56.7	54.7	54.1	55.8	56.2	58.7	58.0	57.3	57.5	56.77
Mean	58.26	58.27	58.17	58.01	57.15	56.07	56.01	57.34	58.47	58.21	58.24	58.16	57.70
1910........	55.8	56.1	55.2	57.6	56.3	56.5	55.4	56.7	58.0	57.2	58.5	57.5	56.73

The mean yearly variation is characteristic: From Sept. till April a temperature slightly above 58° F., June and July approximately 56°. An amplitude of only 2°.4.

* * *

In my former researches on the variations of the annual means of temperature† I showed that the changes in the geographical distribution of excess or deficit temperatures—the annual pleions and antipleions—must be due to changes of solar activity.

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* "Notice sur les variations de longue durée des amplitudes moyennes de la marche diurne de la temperature en Russie (*Bull. Soc. Belge d'Astronomie, 1908*)."

† "L'enchaînement des variations climatiques." Bruxelles, 1909.

Moreover, having utilized all available data, for the years 1891 to 1900, I found a predominance of antipleions for 1893 and for 1900, on the contrary, pleions occupying extensive areas.

In 1900 the temperature at the earth's surface must have been at least 0°.5 C. higher than in 1893, a year of maximum of sunspots. Later, the extensive actinometrical observations of Gorczynski,[*] showing the depression of the solar activity during the year 1903, attracted my attention to the meteorological phenomena of that year. I therefore collected monthly and annual means of temperature, for as many stations as I could, with the intention of discussing the maps, for the decade of years 1900 to 1909, with special reference to the year 1903. But this discussion needed an introduction.

In 1903 Europe was covered by a thermopleion having its center in Russia where the temperatures were 1°.5 C. above the ten years mean. In 1902 and 1904, on the contrary, the temperatures were below the averages. The European pleion of 1903, this wave of excess of heat during a year of diminution of solar radiation, seems abnormal. But it is only a typical example of the complicated effect due to temporary diminution of the quantity of energy radiated from the sun to the earth.

Regional temperatures depend on the direction of prevailing winds, the winds depend on the distribution of atmospheric pressure, the abnormalities of atmospheric pressure depend to a great extent on the distribution of the differences in temperatures and therefore on the geographical distribution of land and sea, of clouds, ice, dust, rocks and vegetation. And to foresee, theoretically, the effects of a given variation of the "solar constant" on the general circulation of the earth's atmosphere and on the local changes in the distribution of temperature is, in the present state of our knowledge, an absolute impossibility.

To approach the simpler problem of the European pleion of 1903, I thought best to begin with the study of the mode of formation of pleions in less disturbed areas, leaving entirely aside, for the present, the dynamical problem of their mode of propagation.

The meteorological records of Arequipa, in Peru, of Bulawayo, in Rhodesia, and of Batavia, in Java, ought to give, it seemed to me, some good information on the origin of pleions.

I added Mauritius, Hawaii and Porto Rico to have records of tropical islands in the Indian, Pacific and Atlantic oceans. The other stations which I took into consideration, for the sake of comparison, are: Colombo (Ceylon), Bombay, Hong Kong, Tananarive (Madagascar), Capetown, Havana, Montevideo and Adelaide.[†]

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[*] Ladislas Gorczynski: "Quelques renseignements sur la dépression du rayonnement solaire à Varsovie en 1903." (*Bull. Mét. du département de l'Hérault.* Montpellier, 1906.)

[†] The figures for Capetown, Mauritius, Bombay, Colombo and Adelaide were obtained from the mean maxima and minima published in *Symon's Monthly Magazine.*

The data for Bulawayo were sent to me by the Rev. E. Goetz, who attracted my attention to the fact that in July, 1903, the thermometers were moved from a small Stevenson screen into a screen of about 12 cubic feet.

I received the data for Hong Kong from F. G. Figg, Director of the Hong Kong Observatory, and those of Batavia from Prof. Van Bemmelen, Director of the Observatory.

The means for Tananarive were taken from the "Observations méteorologiques faites à Tananarive"

The data for Havana and Montevideo were sent to me by the Directors of the Colegio de Belen and the Colegio Pio de Villa Colon.

The meteorological stations of Hawaii and Porto Rico are those of the Weather Bureau of the U. S. Dept. of Agriculture. The data for these stations were kindly sent to me by the section Directors Wm. B. Stockman and Oliver L. Fassig.

I thank most sincerely all of these gentlemen who, by sending me these data, have helped me in my work.

TABLE 4.

	1900	*1901*	*1902*	*1903*	*1904*	*1905*	*1906*	*1907*	*1908*	*1909*	*1910*	MEAN
Arequipa	58.7	58.2	58.2	57.7	57.0	58.2	57.6	57.2	57.5	56.8	56.7	57.6
Bulawayo	(68.3)	(67.2)	(67.3)	(67.4)	65.5	66.9	65.5	64.7	66.5	65.7	65.0	....
Batavia	79.5	79.2	79.5	79.3	78.4	79.7	79.7	78.8	79.2	79.2	....	79.2
Mauritius	74.0	74.3	74.9	73.9	73.2	74.1	73.7	73.6	74.1	73.5	....	73.9
Honolulu (Hawaii)	74.5	74.4	73.9	73.1	73.8	72.9	74.1	73.8	73.1	....	....	73.7
San Juan (Porto Rico)	78.5	78.9	78.3	78.8	77.7	78.4	78.2	77.7	78.5	77.8	77.6	78.2
Colombo	82.3	82.0	81.4	81.5	80.6	81.5	81.6	81.0	81.2	81.0	....	81.4
Bombay	80.8	80.8	81.9	79.8	81.1	80.2	80.4	81.2	80.3	80.2	....	80.7
Hongkong	71.6	72.1	73.4	71.5	71.6	71.6	71.8	72.2	71.8	72.7	....	72.0
Tananarive (Madagascar)	66.0	65.5	67.1	66.0	66.0	66.6	66.2	66.0	66.7	66.0	....	66.2
Capetown	62.6	62.5	62.5	61.0	61.6	62.1	61.5	61.8	61.4	62.9	....	62.0
Habana	77.0	76.1	76.8	76.6	76.5	77.4	76.1	76.5	76.3	76.3	....	76.6
Villa Colon (Uruguay)	63.3	62.2	62.6	62.8	62.1	60.8	62.4	61.5	61.5	61.5	....	62.1
Adelaide	62.8	63.5	63.4	61.9	62.9	62.3	63.7	62.3	63.0	60.9	....	62.7

I made the consecutive totals of the monthly means of temperature for these fourteen stations and it is the diagrams showing the variation of these figures that I shall compare.

Some of these diagrams (Batavia, Montevideo, Havana and Tananarive) derive from totals of °C. and have apparently smaller amplitudes of variations. I reproduce in Table 4 the annual means of all stations expressed in °F., the corresponding points on the curves being marked by vertical lines.

Let us examine the curve of Arequipa first. The 132 figures utilized to trace this curve (Fig. 1), being all totals of the means of twelve consecutive months, are all equivalent to yearly values. The yearly variation being therefore completely eliminated, the ups and downs of this curve are due to temporary deficit or excess of temperature independently of the moment of the year when they occurred and independently of the duration of the occurred anomaly,—the anomaly itself being expressed at the right moment when its cumulative effect on the annual mean was greatest.

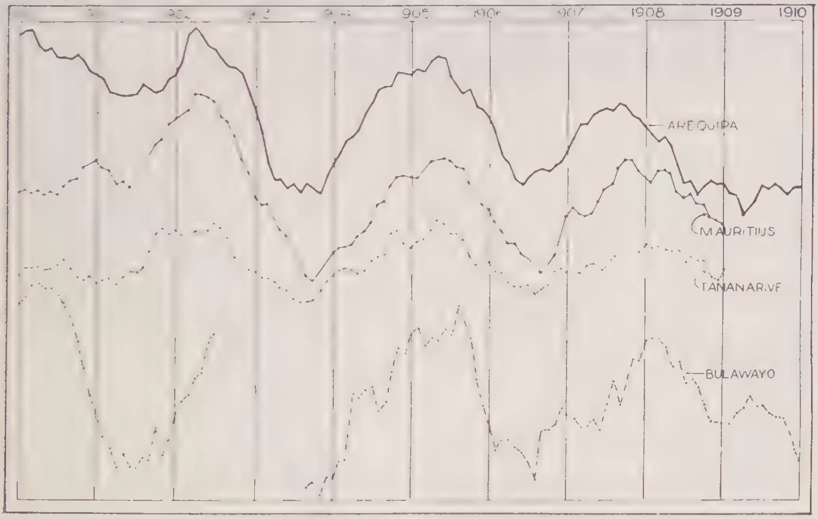

Fig. 1

The curve of Arequipa shows us three characteristic crests and four depressions. The mean temperature corresponding to the crest April 1902 to May 1903 is 58.8. The mean temperature corresponding to the depression Nov. 1903 to Oct. 1904 is 56°.7. A diminution of 2°.1 of temperature; nearly as much as the mean annual variation.*

Then the temperature rises to the crest of May 1905 to April 1906 with a value of 58°.4. The distance between the two crests is three years and one month. The following crest is nearer, the distance being only two years and four months. The distances of the depressions are also smaller than three years and they are nearly equal, the figures being thirty, thirty-one and thirty-four months.

There can be no doubt that these oscillations of temperature correspond to those of atmospheric pressure for which Lockyer† assigned a mean period of 3.8 years and which were studied for the first time by Sir John Eliot.‡

A curve of the consecutive means showing this periodicity for the temperatures observed in Batavia was published by me in Oct. 1909.§

The same curve, together with the curve of consecutive means of atmospheric pressure, was published in March 1910 by C. Braak.||

The correspondence of these two curves is remarkable, also the variations of atmospheric pressure are in advance of those of temperature.

To return now to the question of the formation of pleions, we see that the mean temperature of Arequipa corresponding to the first crest is 1°.1 above and that of the second crest 0°.7 above the mean of the decade 1900–1909, while the departure of the depression is — 1° F.

Instead of these extreme values the departures of the yearly means of 1902, 1903, 1904 and 1905 would have been utilized to draw the maps. The figures are +0.5, 0, —0.7 and +0.5. The map of 1902 (if such a map could be drawn for Peru) would give us the pleion before its maximal development, that of 1904 the antipleion shortly after its maximal development. It is clear, therefore, that with the maps, curves of consecutive means must be utilized and that the crests are the pleions of the maps and the depressions of the curves are the anti-pleions. It is clear also that in the tropical regions pleions must be formed more or less regularly (independently of the atmospheric circulation) under the sole influence of variations of solar activity. This statement needs some words of explanation.

The sunspots, the faculæ, the prominences are manifestations of solar activity, but the only variations which directly interest the temperature of our atmosphere are those of the "solar constant." Now, these variations are more or less problematical. It is probable that such solar manifestations as the prominences and the sunspots are connected with variations of the "solar constant," but this has not yet been proven. It is therefore most interesting to notice that the temper-

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*Or even more than the range of annual variation since, according to the calculations of P. Schreiber, an amplitude obtained by the method of consecutive means (eliminating the annual period) is but 83% of its real value.

† "A Discussion of Australian Meteorology," London, 1909, and other publications.

‡ "A preliminary discussion of certain oscillatory changes of pressure of long period and of short period in India." *Indian Meteorological Memoirs*, v. 6, pt. 2, 1895.

§ " L'Enchaînement des variations climatiques," p. 32.

|| *Meteorologische Zeitschrift*, 1910, p. 121. (Translated from *Naturk. Tijdschrift* and signed: Batavia, Oct., 1909.)

atures observed at Arequipa show some precise correlations with the values of the "solar constant" measured at the observatory of the Smithsonian Institution.*

In the following diagram (Fig. 2) I reproduce the forty-four values obtained for the "solar constant" from observations made in Washington at different dates between Oct. 9, 1902, and May 14th, 1907,† and below, I have drawn the curve of the monthly departures obtainable from Table 3. It is obvious that the number of observations of the "solar constant" is insufficient to show all the details of the variation. Moreover, some measurements may have been taken precisely on exceptional days, giving values which would not have very greatly influenced results of continuous records. Special meteorological conditions may also have influenced the obtained figures.

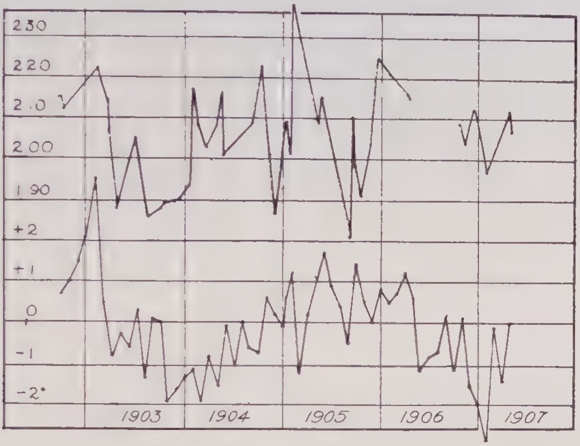

FIG. 2.

But, taking the uncertainty of the results into account, it is astonishing to see such a close agreement between the two curves as that which is exhibited. Supposing that the fluctuations of the "solar constant" and those of the monthly means of temperature observed at Arequipa coincide, which is far from being certain, as the diagram shows that a delay is more probable, I compared the Mount Wilson measurements with the Arequipa monthly departures of temperature. To have comparable figures I made monthly means of the 121 observations taken at Mount Wilson from June to Oct. 1905 and from May to Oct. 1906.‡

The differences between these figures, compared with the differences between the departures of the corresponding months, led me to the supposition that a departure in temperature of 1° F., in a monthly mean observed at Arequipa, is due to a departure of about 0.015 of the "solar constant" from its normal value. If this is the case, we may admit that a comparably small lowering of the "solar constant," if permanent, could produce climatical changes such as those which have really existed during the pleistocene ice age. The required diminution would indeed fall entirely within the range of the momentary changes observed at Mount Wilson, the extreme values being 1.93 and 2.14 calories. But it is useless to make more far-reaching speculations, the acquired facts being sufficient to show the cause of the formation of pleions in tropical regions.

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* C. G. Abbot and F. E. Fowle: *Annals of the Astrophysical Observatory of the Smithsonian Institution*, Vol. II. Washington, 1908.

† *Loc. cit.*, p. 98.

‡ *Loc. cit.*, pp. 96–97.

Considering once more the curve of consecutive means for Arequipa, we notice its striking descent from 1900 till 1909. The pleionian crests could in turn be eliminated by calculating consecutive means of groups of twelve monthly consecutive means. This method has been recently applied, with great success by Axel Wallen in the study of the variation of the level of the Swedish lake Vaener.*

The purpose of my paper being restricted to the question of the origin of tropical thermopleions, I will leave aside the interesting conclusions obtainable from the comparison of the rise or fall of curves in which the crests and depressions of short periodicity would be eliminated. Thus these deductions having been derived from the study of the records of Arequipa the question arises whether they are exceptional. They are not.

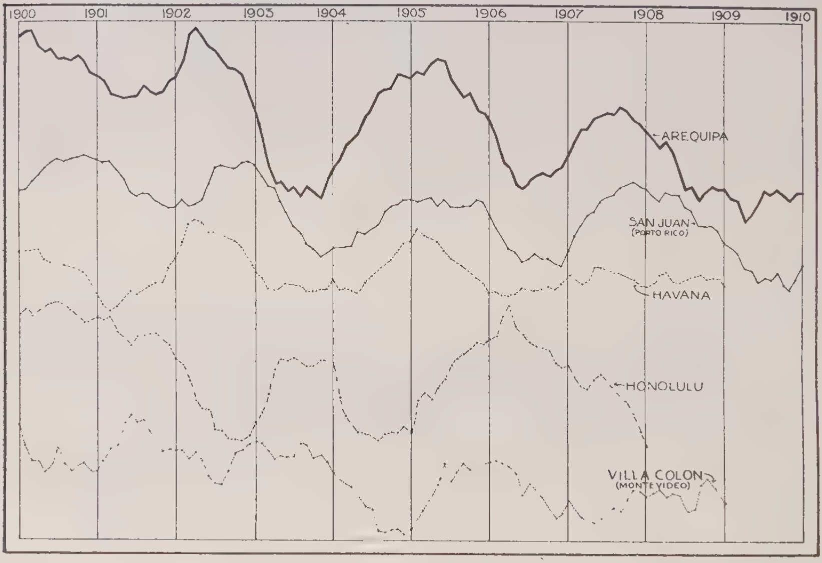

FIG. 3.

The diagram (Fig. 1) shows besides the curve of Arequipa those of Mauritius, Tananarive and Bulawayo.† The curve of Mauritius is more characteristic than that of Arequipa, the crests being more regular in shape. The amplitudes also are slightly more pronounced. But the ups and downs are practically simultaneous, and even certain small details of one curve may be observed in the other. For Tananarive the difference between the first depression and the adjacent crest is 1° C.=1°.8 F., that is to say, nearly of the same magnitude as in Arequipa. In Bulawayo the difference between the depression of 1904 and the crest of 1905 is 2°.6, therefore 0°.5 F. higher than in Arequipa. If we take into consideration the fact that Bulawayo has an absolutely continental but tropical climate and that the climate of Mauritius is oceanic, it is astonishing to see how similar the curves are.

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* *Meddelanden från hydrografiska byrån.* 1. Stockholm, 1910.

† For Bulawayo I omitted the totals corresponding to the change of installation of the thermometers and shifted the curve of 1900–1902 downwards.

Diagram 3 reproduces the curves of Porto Rico, Havana, Hawaii and Montevideo, together with that of Arequipa, to make the comparison easier. The identity of the curves of Porto Rico and Arequipa is striking. In Porto Rico the amplitudes are smaller. In the case of the cited crest we have only a difference of 1°.2 F. And then the most interesting fact is that the curve seems to have been shifted to the right, in other words the same variations occur in Porto Rico a few months later than in Mauritius, Bulawayo or Arequipa. The tropical pleions have to travel towards Porto Rico, they do not originate there. The curve of Havana is an ascending curve. This is perhaps why the depressions are flat. The crests occur sooner than in Porto Rico, being simultaneous with those of Arequipa; but the variation is far from being as characteristic as in Arequipa.

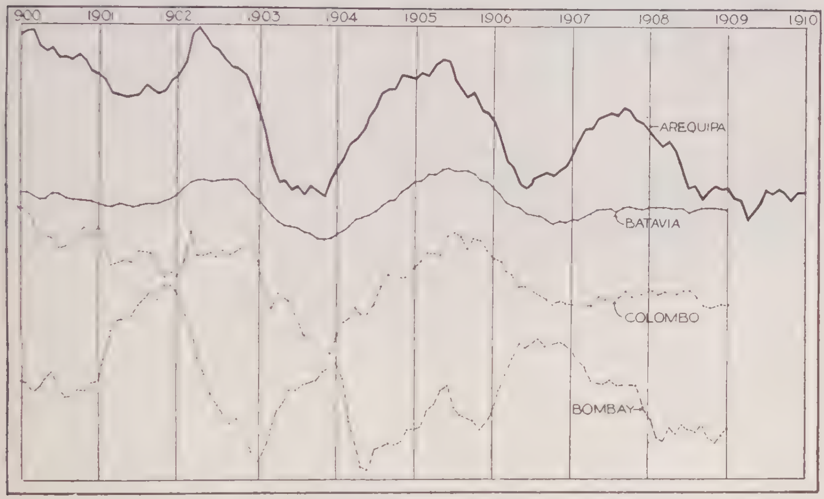

FIG. 4.

Hawaii, in the same latitude as Porto Rico, shows a totally different variation. The curve is inverted. This may be due to an increase or decrease of the trade winds due to a stronger or feebler appeal from the equator. I will leave this question without an answer simply because it would require a special investigation for which I do not possess at present the necessary material of meteorological observations. The curve of Montevideo is still more irregular than that of Honolulu and must, therefore, also be left aside.

Diagram 4 shows the similarity of the variations at Colombo and Batavia. Both curves belong to the type of Arequipa, but they are far from being as perfect illustrations of the solar action. They are, indeed, to a certain extent transitional forms between the curve of Arequipa and the curve of Bombay, which is of the opposite type. If this curve is shifted towards the left, the correspondence of the crests of Arequipa with the depressions of Bombay is very well marked. However, the character of the opposition is more complicated than in the case of Honolulu, because small crests appear in the depressions, just where they ought to be if slightly retarded, as in the case of San Juan. Another interesting peculiarity is shown on the curves of Batavia and Colombo. The crest of 1902-1903 is flat at the first and depressed at the second station. We see now how a change of temperature in one region influences those occurring simultaneously in another region. The curves of Cape Town, Adelaide and Hong Kong illustrate this fact. Here nothing or nearly nothing is left of the simply solar variation of Arequipa or Mauritius, Bulawayo and other stations.

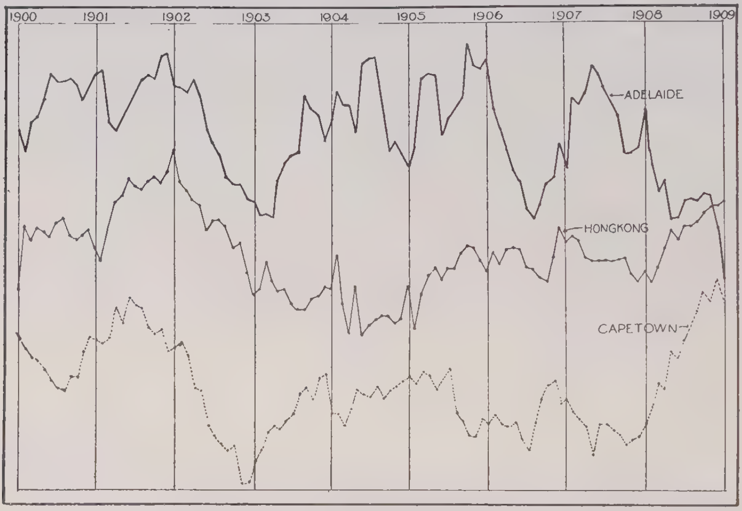

FIG. 5.

In temperate regions the rise and fall of the "solar constant" seem not to affect the temperature of the atmosphere. But this is impossible; and indeed there the climatical changes are more important than under the equator. The reasons why are still to be found. In my "Enchaînements"* I said that the maps of yearly departures for Russia demonstrate the fact that Europe must be considered as a region of travelling pleions, showing the probability of interferences of climatical waves coming from two or more centers of origin. The maps for North America also demonstrate this fact, but those of Australia are very much simpler. The variations of the "solar constant" which have such a marked effect on the temperature of the tropical regions must have an even greater effect on the temperature of the polar regions. At the pole the sun shines continuously during half a year. In the case of the inland ice of Greenland we may therefore expect an important reaction on the Islandic "center of action" of the North Atlantic atmospheric circulation. In the case of the antarctic ice cap, the effect on the sub-antarctic cyclonic system must even be greater.

Dobbs Ferry, N. Y., May 25, 1912.

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* P. 131.

GEOGRAPHICAL RECORD

NORTH AMERICA

Topographical Maps of Counties. A demand has appeared for government topographic maps by county units. The U. S. Geological Survey has accordingly decided to try the experiment of publishing such maps. The first county map, which has just been issued, is of Jefferson Co., Ky. The area was surveyed in cooperation with the Kentucky Geological Survey, the State and the Federal surveys each contributing to the cost of the field work. Jefferson is one of the most irregularly shaped counties in the State and includes portions of the areas shown on the Geological Survey's Kosmosdale, New Albany, Prospect, Louisville, Taylorsville, and La Grange topographic atlas sheets. The map shows most of the county as rolling, although the southwestern portion is almost mountainous. This county map is believed by officials of the Survey to be the most finished and perfect example of a county map which has been published in the United States. The scale is 1:62,500, or approximately 1 mile to an inch, and the contour interval is 20 feet. The map is sold at twenty cents a copy.

The United States-Canada Survey. During the summer of 1911 the joint commission appointed and authorized by the Governments of Canada and the United States to locate and mark the boundary line separating British territory from Alaska advanced field operations northward along that part of the 141st meridian which extends from the Porcupine River to the Arctic Ocean. This work was a direct continuation of the boundary survey that was carried northward from Yukon River to the Porcupine River during the summers of 1909 and 1910. The commission expects to complete this part of the survey in 1912.

The 320 miles through which the 141st meridian extends between the Yukon River and the Arctic Ocean is crossed about midway by the Porcupine River, which thus separates the region into north and south subdivisions that form convenient units for geographic and geologic description. The southern subdivision, about 175 miles in length, may be designated as the Yukon-Porcupine section, and the northern one, about 145 miles in length, the Porcupine-Arctic section.

The Porcupine River is easily navigated by shallow-draft steamboats to New Rampart, an Indian trading settlement on the north bank of the river just east of the boundary line, or about 225 miles above its confluence with the Yukon near Fort Yukon. It thus affords a natural route for the transportation of supplies and makes it practicable to maintain a very convenient base of operations for both sections of the boundary at this point.

At the close of the field season of 1910 there still remained in the northern half of the Yukon-Porcupine section a stretch of about eighty miles south from the Porcupine, the final work of permanently placing the intermediate monuments at intervals of three to five miles and of clearing a strip forty feet wide through the timbered portions along the line. There also remained the topographic mapping of a strip two miles wide on each side of the line for about forty-five miles south from the Porcupine. Of this work the mapping was completed to the Porcupine in July, 1911, but, owing to unforeseen delays, the setting of the monuments and clearing through timber lacked thirty miles of reaching the Porcupine. This work will be completed in 1912.

In the meantime field work was commenced on the Porcupine-Arctic section at New Rampart in June, 1911, and continued northward until the middle of August. The 141st meridian was located to a point within seven miles of the Arctic Ocean. The topographic mapping of the four-mile strip along the line was completed for about 115 miles, or within about thirty miles of the Arctic coast. The boundary was marked with permanent bronze monuments at intervals of four or five miles over approximately seventy miles, or about half the length of the section north from the Porcupine, and the strip forty feet wide was cleared through such timbered portions as occurred in this distance. (*Bull. 520 K, U. S. Geol. Surv., 1912, pp. 3-4*)

Effects of Forests upon Stream Flow. That the forest cover of the White Mountains has a distinct effect upon the navigable streams which head in that region is the statement of the United States Geological Survey. The Director of the Survey has filed his preliminary report on the White Mountains with the National Forest Reservation Commission, and the findings are favorable to the purchase of lands under the Weeks law. The hydrometric showing presented in the preliminary report covers results on two small, almost exactly similar drainage basins of about five square miles each, on the east branch of the Pemigewasset River, one largely clothed with virgin timber and the other deforested and burned. Measurements of precipitation over the areas and of the run-off of the respective streams show that not only was the snow held better in the forested area, but that during a period of seventeen days in April, including three extended storms, the run-off of the stream in the deforested area was a comparative flood—practically double that of the stream flowing through the forested area.

THE GEOGRAPHIC SOCIETY OF WISCONSIN. This Society has been organized under the presidency of Mr. J. A. Merrill of Superior. Its members are teachers of geography. An annual meeting will be held in conjunction with the State Teachers' Association. The programme will consist of papers on professional subjects and reports of work done in various sections. Models and maps made by members will be shown. It is expected also, if the members approve of the plan, that each member shall select a special topic for investigation and report his results to the Society. Each member will make a report on his work at least every other year. It will consist largely of personal investigations of the region near his home, or some research topic in which he is specially interested. These reports are to be duplicated and sent to each member of the Society. It is also planned to organize auxiliary societies to be called Outing Clubs, composed of students and teachers, for the purpose of studying the local surroundings and becoming acquainted with the geography of the home district. This work will not only include geography, but nature study and biology also, as far as these subjects may interest students in the high school, normal school or college. The Outing Clubs are to be affiliated with the State Geographical Society and are to report to its secretary once a year. The secretary is to make duplicates of the reports and send them to presidents of the different Outing Clubs, so that each part of the State may become acquainted through this vigorous first hand touch with the other regions of Wisconsin.

CANADA'S ENLARGED PROVINCES. In March last the Canadian parliament enlarged the provinces of Quebec, Ontario and Manitoba. The area of Quebec was increased from 351,873 to 706,834 square miles; Ontario from 260,862 to 407,262 square miles; Manitoba from 73,732 to 251,832 square miles. The areas thus added are capable of considerable development, their progress will be stimulated by their incorporation in strong provincial governments and they will be of great benefit to the developed regions with which they are now politically united.

Quebec now possesses the whole of the wide Labrador Peninsula from the Gulf of St. Lawrence to Hudson Strait, with the exception of the Atlantic coastal strip which belongs to Newfoundland. She already possessed the southern part of Labrador bordering on the Gulf of St. Lawrence whose extensive forests are now the field of a large pulp wood industry and whose large potentialities in the form of water power will some day be utilized. There are large resources in the northern region now acquired, in forests, fisheries, etc.

The northern boundary of Ontario, formerly following the Albany river in the west, now follows the west coast of Hudson Bay to a little south of Port Nelson, from which a straight line extending S. W. forms the new boundary between Ontario and Manitoba.

Two-thirds of Keewatin is now included in the new Manitoba, which thus controls the entire territory through which the proposed Hudson Bay R.R. is expected to carry much of the wheat of the western provinces to Europe by the new land and water route whose development has now been taken in hand.

RADFORD IN THE CANADIAN BARREN GROUNDS. The Society has received a letter from Harry V. Radford, M.Sc., C.E., dated Dec. 10, 1911, at the igloo of Chief Akulak, Inland Eskimo winter encampment, at the head of Schultz Lake, lower Thelon River, 64°40′ N. 98°27′ W. The ton of supplies purchased for him by the Arctic Club of New York reached him at the mouth of Chesterfield

Inlet in September last, where they were landed by the *Pelican* of the Hudson Bay Company. That company loaned Mr. Radford a small schooner, the *Chipman*, which took him, Mr. Street and three Eskimos with the supplies up Chesterfield Inlet and to the head of Baker Lake. He says that the Inlet may be safely ascended by steamers drawing at least fifteen feet and that smaller vessels can ascend the twenty-five-mile river and reach the head of Baker Lake without difficulty. Baker Lake is an immense inland harbor nearly sixty miles long.

He landed in Chipman Cove, on Oct. 13, where the schooner was beset with ice in a few hours. He sent his Eskimos to the head of Schultz Lake to borrow a sledge and dogs, and on Nov. 13 the party, with about half of their supplies, reached the Eskimo encampment, where they found thirty-two Eskimos living in four igloos. Chief Akulak invited the party to be his guests and built them a snow room connecting with his own igloo. At the time of writing, Mr. Radford was trying to persuade some of the Eskimos to accompany him on his proposed journey to the Arctic coast, this year, but they hesitated to enlist. All the natives who went with Hanbury along the northern coast, in 1902, have since died and the men at Akulak's igloo have heard that the northern country is a starvation land and that the few people living there would be unfriendly to them. Unless Mr. Radford obtains more native assistance he will not be able to go to the northern coast.

He is enlarging his collection of Arctic mammals and birds, has procured much anthropological data, collected a vocabulary of 500 Eskimo words, the dialect spoken at his winter camp, made small ethnological collections from several communities, kept complete meteorological records and added some details to the maps. He is about 300 miles inland from the Hudson Bay coast and the nearest railroad point is Gimli, Manitoba, 1,600 miles distant.

STUDYING BIG GAME. Frederick K. Vreeland of Montclair, N. J., and William F. Patterson of Milburn, N. J., started in July on a trip into the northern parts of Alberta and British Columbia in the interest of the Smithsonian Institution. Their purpose is to determine the northern limit of the habitat of the Big Horn sheep of the Rocky Mountains; to ascertain if in the northern part of British Columbia the Big Horn and the Stoni sheep occupy the same territory; and to capture specimens of both varieties, as also of white goat, mountain caribou, and brown bear. They expect to be gone three months. They will travel by rail to the end of the track on the Grand Trunk Pacific at the Fraser River. From this point they will proceed in canoes by way of the Crooked River to the Parsnip River. When the headwaters of that stream are reached the explorers will make a portage to the headwaters of the Peace River and there re-embark. The two naturalists will explore the mountain wilds on both sides of the Peace River, shooting such specimens as they desire and photographing the country. They expect to get many photographs of wild life in its native haunts. The Canadian law which forbids the exportation of mountain sheep, goats and caribou, will not apply in the present instance, as the Canadian government has conceded the request of the Smithsonian Institution. Mr. Vreeland hunted mountain sheep and goats in the Canadian Rockies several years ago.

AFRICA

THE LOBITO RAILROAD. This railroad is to extend from Lobito Bay, a little north of Benguela, Angola, to Elizabethville, and will be the rail outlet to the Atlantic of the Katanga copper and gold fields. The line is now operated to Lepi station (km. 360). The contract for the construction of the succeeding 270 kilometers to Bihé has been awarded by the government to Pauling & Co. It is expected that this section will be in operation by the middle of 1913. Beyond this point the right of way has been pegged to Cuivre (km. 783.5) and a preliminary survey to Matota (km. 868.5) has been completed.

ASIA

SURVEY OF THE MOUTH OF THE MENAM RIVER. According to the *Daily Consular and Trade Reports,* the Hydrographic Department of the Siamese Navy has begun a survey of the mouth of the Menam River with a view to improvements that will make the river navigable by vessels of large tonnage to Bangkok, the capital of Siam and one of the great ports of southern Asia. The capital is situated about thirty-nine miles up the river and occupies both banks of the Menam. The channel has a depth of not less than thirty feet as far as Bangkok, but navigation is impeded at the mouth by a bar which can be crossed by no vessel of over 350 tons. The result is that most vessels in the sea trade are compelled to anchor at the bar and their cargoes are carried to and from the capital on boats. The city has a population of about 500,000. The growing industries and commerce of Siam are in great need of the improved facilities for the trade of its principal port which it is now expected to provide.

TURKESTAN FOGS. In the *Quarterly Journal of the Royal Meteorological Society* (Apr., 1912) are reprinted extracts from a communication by H. A. Dimo, originally published in the *Journal Cpetnoi Agronomii,* concerning the so-called "Turkestan Fogs." These are characteristic phenomena in the south-eastern portion of Russia. The population stands in fear of them because of the damage which they are supposed to do to agriculture. They occur twice a year, in spring (April) and in late summer (July-August), and are dust fogs, which the east winds raise in the deserts of Central Asia and which are carried to a great distance when meteorological conditions are favorable. The air is very dry during the prevalence of these fogs, and it is this dryness which is injurious to plants.

The author, however, as a result of his ten years' observations in the Government of Saratov, finds that there seems to be no relation between the condition of the harvest and the duration of these fogs. A series of detailed descriptions of the spring fogs is given, these being the most characteristic, and there is also a set of tables setting forth the meteorological conditions of the fogs. In the spring fogs (*Vessennaia Mgla*) the material transported is of desert origin, while in the *Lietnaia Mgla* (summer fogs) it is mostly of local origin. The author also lays emphasis upon the importance of these fogs in the formation of saline deposits. R. DEC. WARD.

COURSES ON THE GEOGRAPHY OF THE ORIENT. In addition to its courses on Oriental languages the École Spéciale des Langues Orientales Vivantes of Paris regularly offers courses on the geography, history and legislation of the Mohammedan countries and of the Far East. The course dealing with the Far East is in the hands of Prof. Henri Cordier, the well-known Orientalist and member of the Institute. During the past winter term he lectured on the history, geography and customs of China. The course on the Mohammedan countries is given by M. Paul Ravaisse, *chargé de cours.* Under this general title he gave two courses during the term: one on the geography and history of Egypt, the other on the geography of the Near East and the history of Arab civilization.

EUROPE

CHANGE OF PUBLICATION. The series of monographs published at irregular intervals since 1902 under the joint auspices of the Oceanographical Institute and of the Geographical Institute of the University of Berlin under the title of "Veröffentlichungen des Instituts für Meereskunde und des Geographischen Instituts an der Universität Berlin" has been amalgamated with the "Geographische Abhandlungen" founded in 1886 and edited by Prof. Penck. The publication in its new form is entitled "Geographische Abhandlungen: Neue Folge," with the sub-title "Veröffentlichungen des Geographischen Instituts an der Universität Berlin." The first number to appear in the new series is numbered Vol. X, No. 1, thus continuing the numeration of the "Geographischen Abhandlungen."

The series of monographs which thus ceases to be published independently was instituted by von Richthofen on the occasion of the founding in 1902 of the Institut für Meereskunde, whose activities were and are closely allied to those of the Geographical Institute of the University. Of the fifteen notable monographs published in this series mention may be made of the following: "Bericht über die wissenschaftlichen Arbeiten der Deutschen Südpolar Expedition unter Leitung von Erich von Drygalski" (Nos. 1, 2 and 5); "Die nordwest-europäischen Welthäfen in ihrer Verkehrs- und Handelsbedeutung" by Kurt Wiedenfeld (No. 3); "Sitia, die Osthalbinsel Kretas: Eine geographische Studie" by Leonidas Chalikiopoulos (No. 4); "Die Eistrift aus dem Bereich der Baffin-Bai.

beherrscht von Strom und Wetter" by Ludwig Mecking (No. 7); "Beiträge zur Kenntnis der morphologischen Wirksamkeit der Meeresströmungen" by Alfred Ruhl (No. 8); "Die Faktoren der Wustenbildung" by Helene Wiszwianski (No. 9); "Die Stellung Armeniens im Gebirgsbau von Vorderasien" by Gustav W. v. Zahn (No. 10); "Die italienischen Portolane des Mittelalters: Ein Beitrag zur Geschichte der Kartographie und Nautik" by Konrad Kretschmer (No. 13), reviewed in *Bull.*, Vol. 41, 1909, pp. 630–631.

THE INTER-POLAR COMMISSION. The Inter-Polar Commission will meet at Rome during the meeting of the Tenth International Geographical Congress, on April 2, 1913.

PHYSICAL GEOGRAPHY

NEW RECORD IN OCEAN DEPTHS. A cablegram from Berlin says that the German survey ship *Planet* sends word from the Pacific that she has made the deepest sounding thus far taken. About forty sea miles off the north coast of Mindanao, Philippine Islands, she has found a depth of 32,078 feet. In other words, the Pacific where the sounding was taken, has a depth of 6.07 miles, exceeding by 482 feet the greatest depth hitherto known.

In 1901, the United States survey ship *Nero,* while studying out a route for our cable line to the Philippines, made a sounding some distance to the southeast of the island of Guam of 31,596 feet, which beat the world's record for sea depths up to that time. This is a depth of 5.98 miles. This location is now known as the Nero Deep. The surpassing sea depth now discovered may appropriately be named the Planet Deep.

This is the second discovery that the *Planet* has made in the neighborhood of the Philippines. A few years ago she traced a deep trough extending for over 200 miles along the east coast of Luzon and only twenty-five to thirty miles from it. She found that the ocean floor descends quite steeply from the island to the trough. This fact and her present discovery probably indicate that the submarine platform on which the archipelago stands, ends rather abruptly on the Pacific front of the islands. The *Challenger* expedition originated the practice of designating all areas with a depth exceeding 18,000 feet as "deeps" and giving a distinctive name to each of them. Some fifty of these deeps are now known.

FROST FORECASTING AND PROTECTION.—The United States Weather Bureau officials on the Pacific coast are giving more and more attention to frost forecasting and to frost protection, and in connection with the effort to improve these forecasts the local conditions of frost occurrence are being studied in great detail. Fruit raising has increased enormously in the North Pacific States of late years, and it is estimated that the number of trees which will come into bearing in the next five or six years will increase the acreage at least tenfold. These fruit interests want to know "just how cold it will get, and just when it will be necessary to start the fires." Mr. E. A. Beals, District Forecaster at Portland, Ore., has been making investigations in four important fruit districts, the results of which have now been published. Boise and Lewiston, Idaho, and the Rogue River Valley and the Yakima Valley were selected as districts in which such detailed observations should be made. "Key" stations were established in these districts, and competent observers were detailed to carry out the work. The "patchiness" of frost occurrence, and the considerable differences of temperature at places which are very near together are clearly indicated in the results of the observations. There are also interesting details regarding the local adiabatic warming of rapidly descending currents of air at the outlets from higher valleys, giving higher temperatures and frequent immunity from frost near these outlets. Many of these details are worked out, and illustrated by means of sketch topographic maps. Several interesting conclusions are reached.

For example, regarding the somewhat disputed connection between the dew-point and frost we find (p. 38) that dew-point observations taken from two to four hours later than the time of the regular evening observation agree more closely with the following minimum temperature than do those taken at the regular hour, and that the average difference and the range of the differences between the dew-point and the following minimum temperature are greatest with clear or partly cloudy weather and least with cloudy weather. Frosts are classified as follows: First, the common hoar frost, which occurs when the temperature sinks to the dew-point and the dew-point is below freezing. Second, a dry freeze, when the temperature sinks below the freezing-point and the dew-point is still lower than that mark. Third, general "freezes," when the air is thoroughly mixed and the whole mass is below freezing. The first two are usually the most damaging. It is probable that the most damage is done by a dry freeze, as the thawing of a plant which is encased in ice is slower than the thawing of one which is frozen without such a covering. In the case of a general freeze the weather is usually cloudy or partly cloudy, and the winds are always somewhat brisk, if not actually strong. The thawing in such cases is slow. These are the freezes concerning which the statement is often made, "The damage was not as great as expected." ("Forecasting Frost in the North Pacific States," by F. A. Beals, *U. S. Dept. of Agric., Weather Bureau, Bull.* 41, 1912.)

R. DeC. Ward.

Measurements of Dew. The measurement of dew has always been a difficult problem, and no form of "drosometer" has proved to be entirely satisfactory. Yet dew, in some climates, is of considerable importance for vegetation, and its measurement is distinctly worth while as a part of the regular meteorological record. At a recent meeting of the Royal Meteorological Society, London, Mr. Sidney Skinner read a paper on "The Drosometer, or Measurer of Dew" (*Quart. Journ. Roy. Met. Soc.*, April, 1912), in which he described a new form of such an instrument. This consists of a hemispherical glass vacuum-jacketed vessel, of the type designed by Sir James Dewar for holding liquid air, which is placed in a box having a circular aperture in the top, through which the cup is exposed, with its rim flush with the exterior surface of the box. When this is exposed to the sky the glass radiates and cools until dew is deposited on the interior of the hemispherical cup. As the vacuum at the back of the cup is an exceedingly good non-conductor, it follows that the heat which is lost by radiation from the inner surface of the cup must be drawn from the air in the cup, and as soon as this is reduced to the dew-point, moisture begins to form on the glass. In the morning, after exposure during a clear night, the small drops separated on the glass have run together, and a circular pool is found at the bottom. The cup is generally exposed at sunset, and taken in in the morning before the rays of the rising sun have reached the place where it stands. A rain-gauge is placed by the side of the drosometer, and consequently the presence of rain in any appreciable quantity can be recognized at once. R. DeC. Ward.

PERSONAL

Captain Amundsen. The Livingstone gold medal of the Royal Scottish Geographical Society has been awarded to Captain Roald Amundsen for his geographical discoveries on his recent expedition to the south pole.

W. M. Davis and R. A. Daly. Dr. W. M. Davis has retired from the Sturgis Hooper professorship of geology at Harvard University. He will continue to reside at Cambridge. Professor R. A. Daly, of the Massachusetts Institute of Technology, has been appointed to the chair vacant by the retirement of Professor Davis.

O. D. von Engeln. Dr. O. D. von Engeln has been promoted to an assistant professorship of geography at Cornell University.

U. S. Grant. Prof. U. S. Grant of Northwestern University, intends to spend most of the summer in Evanston, completing a report on part of the Kenai Peninsula, Alaska, and also completing, in cooperation with Mr. G. H. Cady of the Illinois Geological Survey, the La Salle-Hennepin folio for the U. S. Geological Survey, which is being prepared in cooperation with the Illinois Geological Survey. The Geographic Society of Chicago is contemplating an excursion to the Glacier National Park this summer, under the leadership of Professor Jesse L. Smith, chairman of the excursion committee of that society. If the plan is carried out Prof. Grant expects to go along as scientific adviser of the party.

F. H. Newell. Frederick Haynes Newell, director of the United States Reclamation Service, delivered the commencement address at the Case School of Applied Science on May 29, his subject being "The Engineer in Public Service." At the close of the address the honorary degree of doctor of engineering was conferred upon him.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Die Erzlagerstätten der Vereinigten Staaten von Nordamerika mit Einschluss von Alaska, Cuba, Portorico und den Philippinen nach Geschichte, Form, Inhalt und Entstehung. Von Charles L. Henning. xviii and 293 pp. Maps, ills., index. Ferdinand Enke, Stuttgart, 1911. 10 x 6½.

The author has compiled for German readers a partial synopsis of the work done in mining geology in the United States. As might be expected, the important results obtained by the geologists of the U. S. Geological Survey figure conspicuously throughout the text. In more than one respect the book might be defined as a review of the work done by this federal bureau in the past twenty years.

Some notes on the founding and organization of this celebrated institution have been inserted in the first few pages. We have looked in vain, however, for an appreciation of the strong impetus given to this scientific work through the growing recognition of its value by the more important mining companies.

The short but comprehensive sketch of the mining laws of the United States and the method of locating claims in the various States will enable readers to understand American procedure in this respect. A synopsis of the views of some American geologists on that phase of metamorphism which deals more particularly with the genesis of ores is given. This refers mainly to the various theories brought forward in the United States in the past decade. To Germans who are unacquainted with the enormous progress made on this side of the Atlantic, this résumé will be instructive, although, here, it is felt that more space might not unappropriately have been devoted to the recent consideration of many of the deposits as extreme products of magmatic differentiation. The Great Basin region in particular, and the numerous mines scattered elsewhere, wherein the occurrence of ores is directly connected with former manifestations of volcanic activity supply data which are bound to be of the utmost value to foreign students.

Lindgren's classification of metallogenetic epochs precedes the review of the various ores which appear to have been classed in the order of their relative commercial importance. Their occurrence in the United States and possessions will also reveal to German readers the mass of details accumulated by American mining geologists who have had the advantage of examining the heavily exploited districts of their country. Therein lies the chief interest of this work.

The text offers much of geographic value regarding the occurrence of minerals of economic importance in the two broad zones, roughly east and west of the Rockies, in which the author divides the United States for purposes of economic mineralogy. This also holds true with regard to the regional distribution of these ores. It should be stated here that a comprehensive map showing such distribution would have interpreted far more adequately many a phase of the subject. Its value would have at least been equal to that of the excellent glossary of technical terms appended to the text. All told, the author certainly deserves the gratitude of German students for enabling them to draw on the valuable data accumulated in this country and which might possibly have been beyond their reach otherwise.

Leon Dominian.

The Silva of California. By Willis Linn Jepson. 283 pp. Vol. 2, plates, maps, and indexes. *Mem.* of the Univ. of California. Berkeley, 1910. $10. 13 x 10 each.

This highly important and well-executed work will be a standard reference volume for dendrologists everywhere. It will be dealt with more properly in the journals of botany. I trust that I shall be forgiven the personal note in a comment which the inspection of these two stately volumes leads me to make. Prof. Jepson has completed a task which was the life work of one of the sweetest souls who ever gave up a lifetime to the massive botany of the trees, nowhere more massive than in the Californian mountains, Dr. Albert Kellogg. A quarter of a century ago it was my privilege to share the working table at which Kellogg day after day was elaborating his drawings from field sketches and herbarium specimens. Those were days of high zeal in the California Academy of Sciences, days of disregarded poverty, for not yet had Lick's endowment become available. Kellogg completed his drawings of the oaks and the conifers, he did not live to complete the work which now at last is accomplished. After Kellogg's death Prof. George Davidson endeavored to secure the publication of this great collection of drawings. The purse of the Academy, all at once become fat, was closed against this memorial to the simple soul who had kept alive the flame of study in the long years of poverty, himself a founder of the institution. An obstacle was always grateful to Davidson when he knew himself in the right; he secured a Mæcenas and thus provided for the publication of the oaks, a bantling without academic fathering, under the title of "West American Oaks" for which the text was written by Prof. E. L. Greene. It is most gratifying to observe that Prof. Jepson gives cordial credit to his predecessor. Without slighting in the least the necessities of formal botanical description the author has set before himself the purpose of making his work of value to the layman; this is well accomplished in general. Particular interest will attach to his careful study of the redwood and the sequoia, the big trees of the Sierra and the Coast Range. WILLIAM CHURCHILL.

Canada. By A. G. Bradley. Home University Library. 256 pp. Index. Henry Holt & Co., New York, 1912. 50 cents. 7 x 4½.

The history of Canada is related in a very interesting and vivid style. For one who is seeking only a general knowledge of the critical periods in the development of the Dominion, this book will answer. The presentation is from the viewpoint of an Englishman and therefore is of special value to the American reader. It is worthy of note that the entire discussion is free from bias.

Chapter I presents the geography of the region in an excellent non-technical descriptive manner. It is rather unfortunate, however, that a map does not accompany the text. Chapter II, "The Conquest of Canada," brings out a number of illustrations of the close relation of historical events to the physical environment. A quotation from the last paragraph of Chapter VIII, "Prairie Provinces," referring to southwestern Canada, will indicate the general tone of the geographic discussions in the book:

> "Gold, silver, coal, iron, fruits, wool, tropical products, timber, can all create wealth and population. But these by themselves are not comparable, for the up-building of a hardy race, to a deep rich soil in a bracing climate, where both the essentials of a local subsistence and food products that the outer world must have are grown at the door over thousands of square miles."

While this book is not wholly scientific and no doubt is intended as a history rather than a geography, it is worthy of recognition by the geographer. A descriptive bibliography of 16 titles is appended. EUGENE VAN CLEEF.

SOUTH AMERICA

Reisen in Bolivien und Peru. Ausgeführt 1908. Von Rudolf Hauthal. Maps, illustrations, appendices and index. x and 247 pp. Wissenschaftl. Veröffentl. der Gesell. für Erdkunde zu Leipzig. 7. Band. Verlag von Duncker & Humblot, Leipzig, 1911.

Prof. Hauthal's book is mainly concerned with the former glaciation of South America's tropical plateaus. His earlier work showed Patagonia under a glacial ice sheet from the Atlantic to the Pacific south of the 49th parallel. Here we have him looking for evidence of glaciation in the arid highlands. He found it and the book establishes the fact solidly with all desired detail of glaciated ledges, moraines and morainic lakes. Oversteepened valleys and hanging tributary valleys are not in his vocabulary, but he saw them, especially in the country above Lima. He quotes with approval Steinmann's view that glaciation was contemporary in both hemispheres and the cause, extra-terrestrial. In South America there were plainly two glaciations, the first heavy, its glaciers descending in Peru to 2,800 meters, in East Bolivia (E. side of Cordillera Real?) to 3,000 and in the northern Argentine to 3,500. In the second, the lowest points reached were a thousand meters higher. At present the ice tongues are 800 or 900 meters higher still. One judges that little of Bolivia was ever under ice. This must be charged to the aridity of the region.

The discussion of wind and precipitation that occurs at several points seems to be the weak part of the book, the only weak one in a very strong work. This comes up in connection with the very interesting question of the relative height of the snow line, etc., on the eastern and western ranges. Meyer and Reiss are quoted as finding the snow line lower toward the Amazon in Ecuador. Hauthal, though seeing but the west side of the Cordillera Real in Bolivia, is satisfied from all reports that the opposite is true there, *i. e.,* that the glaciers lie lower on the western slope. He explains it for his season, December to March, by daily clouding toward noon, thus keeping the western sun from shining on the mountains and melting the snow. But he suggests that this might be different in June-July, when a cloudless sky allows equal insolation on each slope. It is argued at page 117 that this would give the snow line equal height on each side, but at 171 the stronger afternoon sun is supposed to melt more on the west and give a higher snow line there. He makes the important point that snow line measures in this region should be made at the same season or they are not comparable. Yet he was astonished above Lima to see the low Sierra de la Sal, 160 kilometers to the east, with more ice on it than on the higher, western ranges. He thinks the east winds from the Amazon basin should be warm and melt the eastern snows or keep the ranges too warm for snow to fall on them.

It seems here that he must fail to take into account the adiabatic cooling that accompanies the uplift of these eastern airs through heights of 10,000 to 20,000 feet. The hot airs of the La Paz valley (p. 172) should be cooled to freezing by the expansional loss of temperature before they reach the plateau even if they were at 90° in the plains and lost some rain with liberation of latent heat on the way. Greater snows are to be expected near the Amazon basin because of the greater moisture in the air there. Prof. Bowman tells me he found the same thing there. It is for this that season matters so much. The present writer recalls his astonishment in three winters that he spent just east of Aconquija in northern Argentine to see the mountain bare in the cold weather but often snow-clad in the rains of summer (December). Nor is the snow fall in Patagonia with east winds strange to anyone familiar with the cyclonic winds.

Apart from this minor detail no one could read Hauthal's pages and doubt the glaciation. It is thoroughly made out.

Even more interesting are his notes of travel, notably in Bolivia on the highland, of which he gives a vivid picture. He has no suspicion of a peneplain. For him it is an upland made from great folds of rocks striking N. W.–S. E. on which numerous volcanoes have poured out their lavas and filled the hollows. A lively example of travel is the extra-post trip from Oruro to La Paz, 200 kilometers in 24 hours over a roadless land. One gets a vivid picture of the handful of Bolivians of European blood ruling the hostile Aymaras who vastly outnumber them, through the Cholo half-breeds of double affinities. His travel notes make singularly good reading and so too his brief touches on the antiquities of the land. At Tiahuanaco the ruins deteriorate perceptibly between visits. The young men of La Paz make revolver practice on the ancient carvings. He has hearty words of praise for citizens of the better classes both of Bolivia and Peru. They are striving for better things.

MARK JEFFERSON.

ASIA

Le Laos. Par Lucien de Reinach. Édition posthume, revue et mise à jour par P. Chemin Dupontès. vii and 392 pp. Map.* E. Guilmoto, Éditeur, Paris. 1911. Fr. 7.50. 9 x 5½.

The author of this work died before his task was done. In the form in which it sees the light it is the erection of a monument to the memory of a competent administrator in the French possessions in the Orient, the gratification of the piety of warm personal regard on the part of the editor, Father Chemin Dupontès. But because of a somewhat mechanical method the monument stands rather as a cenotaph, a far less satisfactory sort of memorial. It is clear that the reverend editor has assembled all the unfinished fragments left by Captain de Reinach and has sought to fill the gaps where the manuscript had not developed the theme in full. This he has done for the most part by the insertion of somewhat extensive extracts from the work of others, his dependence being largely upon the work of Colonel Tournier, the reports of recent governors and other volumes most readily accessible to the student of the affairs of Indo-China. The result of this method is to present the appearance of patchwork. The title, that is to say the proper nomenclature of the people, involves a controversy. The French, following the usage of the neighbor people, give it as Laos. In Mrs. Milne's work on the Shan the Rev. Mr. Cochrane is positive in its determination as Lao; it appears that to this determination he is led by the assumption that s-terminal in Laos is the s-plural, a mechanism of grammar which is inapplicable to an uninflected language. We recall upon the spot a wide variety of sound varying from a clear sibilant through various obscurities to its complete obliteration. In these southern tonal languages the pure sibilant tends toward frequent mutation to the aspirate, and such an aspiration when terminal after a vowel is not always recognizable by the European ear. Despite the positive statement of Mr. Cochrane, rendered at some little distance from the seat of the Laos, we incline to regard the French as the better authority and shall continue to employ the designation Laos. No matter what the general designation may be decided to be, the study of the Laos must engage with three distinct categories of population, the Thaï, the Kha, and alien migrants from the limiting communities of China, Yunnan, Annam, Cambodia, Siam and Burma; these three elements form various areas of contamination surrounding foci of Thaï and Kha culture. Upon these elements Captain Reinach spent considerable and enlightening study which is manifest in his chapters on social life and manners and customs. He is equally full and satisfactory when dealing with matters of administration.

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* Listed under "French Indo-China" in *Bull.*, Vol. 43, 1911, p. 877.

Owing to the conditions of his employment in the colonial service the author is able to add little that is new in his study of the geography of the region. His duty held him in the second rank of progress, his was the task of following in the steps of exploration and of conquest, of consolidating the wild and establishing the new civilization. But he has been able to present many definite determinations, valuable points to have settled in economic geography, the head of steam navigation in the rivers, the head of canoe navigation still farther within the interior, the terminus and the feasibility of the narrow trails which are the best the jungle affords by way of roads. Despite the defects of the manner of the completion of the work, it must stand as by far the best account of a state which will possess in the future still greater value to France as the years uncover its designs upon Siam, whose inner entrances Laos covers.

WILLIAM CHURCHILL.

Seistan. A Memoir on the History, Topography, Ruins, and People of the Country. In four parts. By G. P. Tate. Parts I to III. 271 pp. Maps, ills. Superintendent Government Printing, India. Calcutta, 1910. £1. 12s. 12 x 10.

This is a memoir on the history, topography, rivers and people of the region. The information was chiefly gathered during the sojourn of a boundary commission. The volume includes the treatment of the first three of the above named topics. It is written without perspective. The history so-called is so dreary a succession of trivial records, that it can be useful only as a source for scholars. Even these, it would seem, might derive advantage from a clear and summary picture of the larger meaning and progress of human events in that obscure part of the world.

The same criticism is painfully true of the chapters on the "Topography of Seistan." They commit the unpardonable sin of being, except for one district, without maps. There is nothing to show the relation of localities to each other, or of the whole to its environing territory. The keenest reader, who has not studied the geography elsewhere, is helpless in trying to picture the country. We are told, for example, that the "Khash River emerges from the hills at a place called Dilaram." No doubt the Khash River is an interesting stream, and we might like to be told what kind of a valley it has, what its volume is, and its direction of flow, where the hills are, and their character. So far as we are concerned, it might as well be in the Sahara. So we are led from one inconsequential detail to another, and at the end of a paragraph, at the end of weary pages, we wonder if anything in that part of the world has a place or a meaning.

It is interesting to read that Seistan has suffered progressive dessication, but we wonder how this is arrived at by a "mental survey of the country." True it is affirmed that there are old beaches and deltas, but again there is no coherent account of the evidence, and not a single photograph, though the party made good pictures of some kinds of things. Two maps, following page 177, do illustrate the delta of the Helmand, but as a whole the account emphasizes that rarity of good geographic description on which Professor Davis has laid much emphasis. It is without method and conveys no adequate idea of the region, of its features, or of the principles illustrated in its physical history. A large number of full-page plates give effective reproductions of ancient human structures.

We have rarely seen a volume in which one could read so much and get so little. There are many facts, as there are many grains in an acre of Seistan sand. As to relative dryness no conclusion is here urged. The plan proposed in the preface to record information rather than aim at literary effect, is fully realized. A. P. BRIGHAM.

AUSTRALASIA AND OCEANIA

Reisen in Kaiser-Wilhelmsland (Neuguinea). Von Dr. Otto Schlaginhaufen. 19 pp. Map, ills. Abhandl. und Berichte des Kgl. Zool. und Anthrop.-Ethnogr. Museums zu Dresden, Vol. XIII, 1910, No. 1. B. G. Teubner, Leipzig. 1910. Mk. 6.50. 12½ x 10½.

When the German New Guinea Company made its start as a political balance weight to the British North Borneo Chartered Company there was immediate prospect of the exploration, even if not the commercial exploitation, of the northern slopes of the great and little-known island. But when that company surrendered its plans to an imperial protectorate the interest slackened and for several years no activity of discovery was manifest. Now that the colony has been associated with the earlier and better founded settlement of the Bismarck Archipelago there has been a considerable revival of interest. In this pamphlet Dr. Schlaginhaufen presents the cursory record of two inland trips which in 1909 he accomplished into the unknown inner land of New Guinea. One was the exploration, to a distance of more than a degree of latitude, of the lower course of the Kaiserin Augusta river, which debouches a few miles north of 4° S. The other was a mountain climb across the mass of the Torricelli Mountains and a visit to the inland communities of Apur and Akur. Every such report, brief though it be, is of inestimable value in adding to our knowledge of this least-known of the great islands of the world. WILLIAM CHURCHILL.

EUROPE

Dünenbuch. Werden und Wandern der Dünen, Pflanzen- und Tierleben auf den Dünen, Dünenbau. Bearbeitet von F. Solger, P. Graebner, J. Thienemann, P. Speiser und F. W. O. Schulze. viii and 404 pp. Ills. Ferdinand Enke, Stuttgart, 1910. Mk. 10. 9 x 6.

A description and study of sand dunes on the German coasts. The geological part was written by Professor Solger, the botanical by Professor Graebner, the zoological by Dr. Thienemann, the entomological by Dr. Speiser, and the technical by Professor Schulze.

Professor Solger distinguishes three types of dunes which correspond each to a certain type of shallow coast. On bluff coasts no dunes are formed because the land, being continuously eaten away by the waves, leaves no place for the sands to collect. The shallow coast in process of advancement is the typical dune coast. It has a sand beach with a wooded or shrubby hinterland back of it. The sand blowing inland from the beach gathers along the outskirts of vegetation forming the first line of dunes ("Ur-Düne") on which *Psamma Arenaria* soon appears as the first pioneer of vegetation. In proportion as the coast advances, and the width of the beach thus increases, a second line of dunes is formed along that new border line of vegetation, and is occupied by *Psamma* in its turn, while the one farther back is now invaded by species from farther inland. This process repeats itself over and over again until a complete system of parallel ridges accompanies the coast, always with the floral transition from *Psamma* at the front to a more and more differentiated vegetation farther back, each stage of which corresponds to an anterior stage in the formation of the coast.

Another type is found in those locations where, owing to strong coastal currents which carry the sands away, the shore line is practically stationary. Therefore the sands which are blown up from the beach accumulate pretty nearly at always the same places, so that one line of dunes only can be formed but of a height considerably superior to that of the previous type. This type is best developed on the *Nehrungen* (spits) of the Baltic coast. The dunes there used to be so stationary that considerable forests grew on them. But during the Seven Years' War they were deforested by the Russian troops, and since then the dunes have wandered all across the spits, burying everything under them. The author devotes a special chapter to the heroic efforts made in these provinces to stop further progress of the dunes, and prevent the complete filling in of the lagoons (*Haffe*) by reforesting the dunes.

A third type is found on shallow coasts in process of recession. It occurs wherever a beach which was formed under the protection of a neighboring headland loses that protection by the destruction of the latter. Then the sea begins to eat away the beach and sooner or later also attacks the dunes, forming a dune bluff. In proportion as the coast recedes, the sands taken from the original dunes are blown farther inland, the wind pushing the dunes, as it were, before it until they finally rest on the soil of the land itself, and when this land is attacked by the waves in its turn it offers the misleading aspect of a bluff coast with dunes on top of the bluff.

The author illustrates these processes very fully by exact reference to different parts of the German coast near popular seaside-resorts, thus enabling even persons not especially acquainted with the geology of Northern Germany to study these processes *in situ.* The American observer who has studied similar problems on the shores of Cape Cod and its neighborhood will find there many points of comparison along different lines.

In an additional chapter the author proceeds to a short study of desert dunes, with especial reference to the inland dunes of Northern Germany, developing his special theory of the latter having been formed under the influence of prevailing east winds.

Professor Graebner, in his description of plant life on the dunes, first explains the general conditions needed for dune vegetation and then discusses the various types of plants found on the different types of dunes. On the beach itself and the "white" sand dune succulent and sand-catching species predominate (*Salicornia, Hockenya*). At a later stage *Hordum, Petasites,* etc., fasten the sand with the network of their roots, allowing the first annuals to grow. After them various *algae, Cakile maritima, Salsole* and others already give a "grey" aspect to the dune forming the first vestiges of soil which allow the growth of biennials (*Oenothera*), and of certain creeping shrubs as *Salix repens, Rosa pimpinellifolia,* etc. Later still, the "shrub dune" bears *Hippophaïs, Salix daphnoïdes, Quercus pedunculata,* and in its moist hollows a pronounced marsh and salt flora can develop. The "wooded dune" represents the conclusion of the process, and the variety of its trees is greater than might be supposed. The inland dunes, too, are treated in a botanical chapter by themselves.

The zoological parts contain principally enumerations and descriptions of the various animals, birds, reptiles, and insects which inhabit the dune region, together with hints about how to find them; and the last chapter describes the technique of the different ways and methods of regulating the progress and formation of dunes in the past and present.

The book is richly and well illustrated, and though intended principally for the intelligent lay reader, contains much that is of value also to the specialist.

MARTHA KRUG GENTHE.

ECONOMIC GEOGRAPHY

Die Kabel des Weltverkehrs, hauptsächlich in volkswirtschaftlicher Hinsicht. Dargestellt von Dr. Max Roscher. x and 240 pp. Map. Putkammer & Mühlbrecht, Berlin, 1911. Mk. 6.60. 9½ x 6½.

A useful volume; if it had an index it would be a veritable dictionary of cable-knowledge. The first cable, in 1851, was of course Dover to Calais. Transatlantic cables cost $1,000 a mile, telephone cables twice as much and are limited to 250 miles; land lines half as much and wireless less than half as much. The great cables earn $96 to $128, cost for repair $38, and to operate $27 a mile. Deep sea cables last 40 years, shallow ones 25. The English line, Cape Verde to Pernambuco, worked for nine years once without interruption. The longest clear stretch is Vancouver-Fanning Island, 4,000 miles. Each mile of this cable contains 600 pounds of copper and 400 of guttapercha, costing $8 for guttapercha to every dollar expended for copper. Guttapercha is the only good insulator hard enough to stand the deep sea pressure.

England is the great cable power. She had in 1908 over 158,000 miles of cables, the United States 58,000, France 27,000 and Germany 18,000. But Germany laid 80 per cent. of her cables in the last decade, we 45 per cent. of ours, France 39 and England only 17 per cent. of their respective lines, though England's 17 per cent. was 28,000 miles, more than any other country laid. The Germans now have cables to North America, to Liberia and thence to Brazil and a line in the East Indies from Celebes to Yap in the Caroline group, where it connects with our Pacific cable and goes on to China and Japan. Other American lines give the Germans connection with the west coast of South America, but to their own colonies in South Africa, to Australia and India they have only British connections. The drawback appears to be really what happened during the Boer war. In war time only open messages can be sent, through a British censor. Monopoly makes the price high on the West Coast of Africa, but it is commercial not national monopoly. Cape Town is equally British, but, being reached by several lines, a word from Germany costs there but 65 cents against $1.40 to the West Coast. From Germany to Chile it is but $1.07. The new British Pacific cable, too, lowered the rate to New Zealand from $2.75 to 78 cents—surely a low rate.

A strong argument is made for the influence of cables on commerce. British commerce in the region reached only by British cables is four times as great as German business, though in general the relation of British commerce to German is only 5 to 4. The lands involved are largely British. Roscher sees British opposition to the expansion of German cables everywhere. The most serious form of this is the difficulty of getting "landing right" for a new cable. The early companies (all British) got concessions from countries eager to have cables that gave them exclusive right to land a cable in their territory. Such a concession, or such a claim, is keeping the Germans from landing a cable in the Argentine Republic, whither they would like to extend their line from Pernambuco.

If Roscher's map is correct, the British are similarly excluded from most of the North Sea and all of the Baltic, where only the Danish Great Northern operates.

The author sees no commercial competition in wireless, at present, owing to its uncertainty. He discusses the most various relations of cables to culture, commerce and war, and the history of cable laying is set forth very interestingly. The book is clearly written and has an admirable map of cables in 1908.

Mark Jefferson.

Railroad Traffic and Rates. By Emory R. Johnson and Grover G. Huebner. Vol. I, Freight Service, xv and 523 pp. Map. Vol. II, Passenger, Express, and Mail Services. ix and 448 pp. Map, ills., index. D. Appleton & Co., New York, 1911. $5. 9 x 6.

The preface states that the work has grown up in connection with advanced instruction in transportation given in the University of Pennsylvania. It is designed, however, mainly for students of railway problems who are actively engaged in the service. Many practical experts have read and criticized the various chapters. The work, therefore, takes on an authoritative character, both from the authors and their critics.

With the exception of two of the three introductory chapters, Volume 1 is occupied with matters pertaining to freight traffic. These two chapters deal with the characteristics, volume and earnings of American railway traffic in general. Some interesting factors of a geographic nature at once appear. A ton of freight is hauled on the average in the United States, 254 miles, or more than three times as long a haul as in Great Britain, France, or Germany. The ton mileage is six times as great as in Great Britain, nine times as great as in Germany, and twenty times that of France.

Again, it is the vast size of our territory which has prescribed large units of traffic, as the profitable method here, in contrast with the small units of comparatively local traffic in European countries. Topography has its influence here, but, curiously, one large result is in equipment and construction, for the majority of the trunk lines follow the parallels of latitude, even though they must thus cross the mountain systems of the East and West. The efficiency of our transportation appears in the fact that industry shows a high degree of territorial specialization, in spite of the necessity of carrying heavy raw materials over longer distances than prevail in most countries. The chapter on the sources of American railway traffic is a compact summary of the distribution of our chief resources and products.

It is a rather surprising fact that manufactured commodities and even lumber and forest products slightly exceed in tonnage the products of agriculture. The mineral tonnage is more than half the total, coal being the largest single item. More than half of the total tonnage originates east of Illinois and Lake Michigan, and north of the Ohio and Potomac Rivers.

Another interesting geographic change is seen in the decline of cotton shipments from the south Atlantic ports. This is due to two causes, viz., the westward movement of cotton production, and the increase of local manufacture in the Southern Appalachians. A valuable table on page 44 compares the types of freight on several great railway systems. The Chesapeake and Ohio and the Pennsylvania railroads have the highest percentages of mineral traffic, 73 and 66 respectively. On the other hand, about one-fifth or sixth of the percentage of agricultural products is shown by these roads, as compared with the Rock Island, Santa Fé, Central of Georgia, or St. Paul.

The organization, management, classification and rates of the freight service occupy the remaining twenty-two chapters of the first volume. The expositions are practical, and technical, and are accompanied by many statistical tables, blank forms in use on various roads, and full lists of references.

Volume 2 deals with the passenger service (eight chapters), passenger classification and fares (three chapters), the express service (ten chapters), and provisions of the rate act of 1910 (one chapter). Appendix I reproduces this act, a document of more than thirty pages, and Appendix II gives the decision in the Reno Rate Case.

The index is at the close of the second volume. The attitude of the authors is expositional and neutral, for the work neither attacks nor defends the railroads.

A. P. BRIGHAM.

Railways in the United States. Their History, Their Relation to the State, and an Analysis of the Legislation in Regard to Their Control. By Simon Sterne (1839–1901). With supplementary Notes continuing the Record to 1911. xiii and 209 pp. Index. G. P. Putnam's Sons, New York, 1912. 8 x 5½.

Mr. Simon Sterne was long a member of the New York bar and during the later decades of the nineteenth century was a high authority on the legal and governmental aspects of railway management. This volume is a republication of papers and addresses prepared by him at various times. They represent, in substance, material prepared by Mr. Sterne for the use of railway commissions. While showing the conditions of an earlier period, the work is still available for the education of legislators and voters, in the important railway problems of the present day.

The first chapter deals with the history of railways and with their economic and social aspects and results. Railway development from its beginnings, the effect of railways in diminishing cost of commodities, the more even distribution of products, and the increase of production by reason of railways, are among the topics treated and they offer some principles and examples which are pertinent to geography. There is also a comprehensive summary of railway management in the leading countries of Europe. Nearly half the volume is occupied with an account of legislation concerning railways by the various states and by the federal government. "The Relation of the Railroads to the State" is an address first given before the Wharton School of Finance and Commerce of the University of Pennsylvania.

The preface includes a list of the author's more important legal arguments and reports. The editor has included supplementary notes, bringing the view down to the year 1911. A. P. BRIGHAM.

Highway Engineering as presented at the Second International Road Congress, Brussels, 1910. By Arthur H. Blanchard and Henry B. Drowne. x and 299 pp. Appendices, indexes. John Wiley & Sons, New York, 1911. $2. 9 x 6.

The authors are teachers of highway engineering in Columbia University. An international congress on roads was held in Brussels in 1910. The object of this volume is to make available in compact form the voluminous report of that meeting. The authors express the opinion that foreign practice has not received from American engineers the attention which it deserves. As 124 papers were presented, it is evident that the substance and conclusions only could be included in this work.

The first congress of this nature was held in Paris in 1908. At that meeting a permanent commission was appointed to promote in various ways progressive road-making for all countries. Titles of all the papers presented are given by the name and countries of the authors, and in groups according to subject. The introductory chapters include also an account of an exhibit of machinery and materials held at the time in Brussels and of the excursions and receptions given.

Most of the volume is occupied with abstracts of the technical discussions. The range of these is very broad, concerning not only materials, constructions and maintenance, but such subjects as removal of snow and ice, road signs, pipe systems in roads, tramways on roads and streets, highway bridges, and tires. Full subject and author indexes are furnished. The book is for reference and is of interest to engineers and special students rather than to the general reader. A. P. BRIGHAM.

Principles of Rural Economics. By Thomas Nixon Carver. xviii and 386 pp. Index. Ginn & Co., New York, 1911. 8 x 5½.

The author is a professor of political economy in Harvard University, but has had the advantage of early life spent on a farm in the middle west and of much personal observation of farming in this country and in Europe. He is therefore justified in attempting to contribute toward the solution of the rural problems so long overlooked, but now recognized and studied. The first chapter, on general principles, discusses ways of getting a living. The modern farmer, who lives on the profits rather than the products of his farm is shown to be in close economic relations with his fellows. Agriculture is, however, peculiar in its seasonal character, in its domestic aspect, and in the features of self-employment and the interdependence of the sexes. Urban superiority is a false conception, while isolation is the menace of farm life, as congestion is the menace of city life.

Nearly one-fourth of the volume, is devoted, in chapter II, to a historical sketch of modern agriculture,—the early stages, beginnings of modern agriculture, beginnings of American agriculture, and the period of national development. Pages 89-105 give an informing exposition of geographic changes incident to the invention of machinery, and to the development of new processes in farming, and the working up of farm products.

Good statement and defence are given of the view that a large product per acre is not in itself desirable. The real object is the large product per man.

Hence intensive culture and small farms, are not as some think, the solution of all our problems. The striking fact is set forth that the substitution of cotton for woolen has made a great saving of land, one acre of cotton producing as much clothing as ten acres given to sheep raising.

Other chapters treat management, distribution of agricultural income, and problems of rural social life. The book has a detailed outline of contents, a bibliography of eight pages, and an index. It is closely but clearly written, from the point of view of the economist, and it deserves, as it requires, careful study. While it is keenly interesting, it is not a book of popular information, but a compact manual for the serious student of agriculture.

A. P. Brigham.

The Principles of Handling Woodlands. By Henry Solon Graves. xxi and 325 pp. Ills., index. John Wiley & Sons, New York, 1911. $1.50. 8½ x 5½.

The author shows his grasp of the existing problems of woodlands by basing his work on the actual status of knowledge in the hope that the next step will be towards ideal conditions. The work deals with the treatment of woodlands, omitting methods of artificial seeding and planting, and discusses systems of cutting, the improvement of the forest and problems of protection. Four systems of cutting are explained: the selection, clear-cutting, shelterwood and coppice systems. Under the improvement of the forest, the author presents the improvement of the composition of the stand, of the form of the trees and increase in the rate of growth and in the yield and value of the product. A large section is allotted to the protection of forests from fire. The book is well printed and well arranged to serve as a convenient hand-book.

Robert M. Brown.

EDUCATIONAL GEOGRAPHY

Anleitung zum Kartenzeichnen. Von Konrad Kretschmer. viii and 72 pp. Map, ills. Hugo Spamer, Berlin, 1911. Mk. 3. 8½ x 5½.

Professor Kretschmer has tried to write an easy manual for beginners at map construction and has succeeded admirably, for the little book is simple, clear, practical and up-to-date. One needs but the elements of trigonometry to use it. It gives much more space to practical exercises than to the general theory, which is yet always there and it makes possible the construction of even equivalent azimuthal map-nets. Kretschmer breaks away from the traditional perspective projections, there is not a word here of the orthographic and stereographic projections that figure in all our text-books, but are little used in our atlases. Beginning with Earth dimensions in meters, he goes at once to their use for map-construction by means of the scale, beginning with conic nets, then passing to azimuthal ones and the Mercator. The example is always an actual problem of an appropriate region on a specified scale and the student is shown how to work out every detail. Tangent cones, simplified cones and Bonné's projection are all explained and the construction by coordinates of curves of excessive radius. The special applications of each projection are made plain. This is distinctly the best introduction to map-making that the present reviewer is acquainted with.

Mark Jefferson.

Teachers' Geography. Man and Climate. With Practical Exercises. 3rd Edition. By Mark Jefferson. 78 pp. Maps. Published by Author at Ypsilanti, Mich, 1911. 11 x 8.

This book embodies some of the results of a teacher's long experience with students in Normal Schools and Colleges. It cannot be denied that the majority of these students came to their professional training victims of the sins of omission and commission of Elementary and Secondary Schools, and as the case now stands, so far as geography is concerned, Normal Training Schools are called upon to supply the defects of early instruction and to prepare the student to teach. Moreover, both of these tasks must be accomplished within a narrow time limitation. That the author appreciates this situation is evident from the simple concrete fashion in which he presents his thesis, and the practical character of its development.

In the twelve weeks' course here outlined Mr. Jefferson devotes his instruction to the Distribution of Man upon the earth, and to Climate, one of the controlling factors of that distribution. Hand in hand with class instruction are daily exercises planned to make the student familiar with the weather elements, to test and strengthen his judgment concerning their effect upon his life, and to clarify the relation of his individual experience with the general laws whose effect on the earth at large he is studying. There are probably no phenomena about which young teachers show more ignorance than those connected with the general subject of climate. For this reason such a definite treatment, embodying a close study of maps as well as of daily weather happenings is destined to be of distinct service. The author has shown admirable restraint in confining this brief course to a definite topic and its applications. A teacher thus carefully trained in the use of maps and alert in his observation has the best possible foundation for the future culture his experience will bring him. If all teachers of geography could become familiar with the subject as presented in this admirable book the teaching of elementary geography would be on a distinctly higher plane. C. W. Hotchkiss.

PHYSICAL GEOGRAPHY

La Sismologie moderne. Les tremblements de terre. Par Comte de Montessus de Ballore. xx and 284 pp. Maps, ills. Armand Colin, Paris, 1911. 4 fr. 7½ x 4½.

Among the more highly civilized nations France is almost alone in having no semi-popular work upon earthquakes from an authoritative source. If this is to be explained by a belief that the pedestal of France is entirely stable so that the convulsions of the earth are without an intimate practical interest to her people, the idea should have been dispelled when on June 11, 1909, the district of Provence was strongly shaken by earthquakes. General interest in earthquakes having now been aroused by the recent destruction of Messina, the time is opportune for the appearance of a popular work written by one of the world's first authorities in this field and one fortunately gifted with a facile pen.

The earlier chapters are given to the evolution of earthquake apparatus, and in chapter V, which immediately follows, there is found the best general treatment in small compass of the multiple nature of earthquake waves as determined by both theoretical and mathematical methods on the one hand, and by instrumental and observational studies upon the other.

In chapter VI, which treats of the seat of the disturbance (*foyer*), the absurdity of the assumption of the earlier Mallet school that the shocks radiate from a definite point, is pointed out; though it is none the less evident that there is some hesitation in fully applying the newer explanation to which the Count gives his adhesion in the introduction, viz., "that the earthquake results from those large earth stresses which have elevated the mountains and have folded, broken and slid the rock strata one over the other." The earthquakes of Ischia (1883), of California (1906) and Assam (1897) are taken to represent three types of disturbance: the volcanic, movements localized along an extended line of fracture, and the mass movement of a large block. "These three distinct cases," the author states, "represent all possible combinations of the nature of earthquakes as regards the form of the epicentral region, and one sees that the old idea of the epicenter in its geometric sense applies to the first case only." To the reviewer it does not appear to be proven that the three cases differ in any essential respect, the apparently extinct Monte Epomeo having made no response to the Ischian earthquake of 1883, and Johnston-Lavis having shown that the site of Casamicola lies at the intersection of important fractures upon the island.

In succeeding chapters earth sounds either accompanied or unaccompanied by shocks, aftershocks, sea-quakes, seismic geography, the relation of earthquakes to earth relief, and the effect of shocks upon the appearance of the ground, are one after the other discussed in an able manner. A quite valuable chapter is devoted to exploding many supposed relationships of earthquakes; as, for example, to the phases of the moon, to the time of the day, to the season of the year, etc. An attempt is made to correlate the great earthquake belts of the globe with the mountain arcs of Suess's Pacific type, to which in the main they correspond well. Though these belts thus appear to correspond to belts of folded strata, it is not, we believe, to be concluded that they are on this account the direct expression of the folding process, but are, on the contrary, a consequence of faulting much nearer to the surface.

The concluding chapters treat of the constitution of the earth's interior and of proper earthquake construction. When in accepting Professor Wiechert's supposed zones, composing the earth's core, the Count says that "the progress of observations can without doubt modify in some proportions the thickness of these diverse zones, but it is not probable that they should be later changed in any essential way, since this succession has been deduced from experiment without the intervention of theories or hypotheses," we believe he goes too far. In our belief there are several more or less unconscious hypotheses introduced in interpreting the earthquake diagrams which enter in an important way into the conclusions.

It will thus be seen that "Modern Seismology" is not a mere outline of the Count's larger manuals, but is written along original lines and is a valuable contribution to geophysics. WILLIAM HERBERT HOBBS.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

PHILIPSE MANOR HALL AT YONKERS, N. Y. The Site, the Building, and Its Occupants. By Edward Hagaman Hall. 255 pp. Ills. American Scenic & Historic Preservation Society, New York, 1912. 7½ x 5. [This delightful book gives the history and romance that centers in and around one of the most important American relics of seventeenth and eighteenth century times. It was here that Col. George Washington, who had won distinction in the French and Indian war, sought the hand of Mary Philipse, esteemed as one of the most beautiful and accomplished young women in the Colony of New York, only to learn that her promise had been given to Col. Roger Morris. Philipse Manor Hall is now maintained and preserved as an historic monument.]

BIRDS AND MAMMALS OF THE 1909 ALEXANDER ALASKA EXPEDITION. By Harry S. Swarth. 161 pp. Maps, ills. Univ. of California Publications in Zoology, Vol. 7, No. 2, 1911. Berkeley. 10½ x 7. [The Expedition was sent out at the cost of Miss Annie M. Alexandre to explore parts of the Sitka district not covered by the expedition of 1907. Sixteen islands and six points on the mainland were visited. This report contains a report on the localities visited, check lists and descriptions of 137 birds and 27 mammals collected, and remarks on their distribution.]

REVIEW OF HISTORICAL PUBLICATIONS RELATING TO CANADA. University of Toronto Studies. Vol. 15, 1911, xi and 220 pp. Index. Publications of 1910. Vol. 16, 1912, xiii and 211 pp. Index. Publications of 1911. Edited by George M. Wrong and W. Stewart Wallace. University Press, Toronto. $1.50 each. 10½ x 7. [Well written reviews of current publications relating to Canada and treating of its history, economics, geography, statistics, archæology, ethnology, folk-lore, law, education and bibliography.]

THE YEAR BOOK OF BRITISH COLUMBIA AND MANUAL OF PROVINCIAL INFORMATION. By R. E. Gosnell. 358 pp. Ills., index. Published by Authority Legislative Assembly, B. C. Victoria, B. C., 1911. $1. 8½ x 6. [A work of reference in respect to matters of general interest relating to British Columbia.]

AMONG THE ESKIMOS OF LABRADOR. A Record of Five Years' Close Intercourse with the Eskimo Tribes of Labrador. By S. K. Hutton. xviii and 340 pp. Maps, ills. J. B. Lippincott Co., Philadelphia, 1912. $3.50. 9 x 6. [The book gives a plain picture of the Eskimos of Labrador, as the author saw them for years, in their homes, at their work, and on their hunting and other journeys. It embraces all phases of their life and describes their bleak habitat. Copiously illustrated with well-chosen photo-engravings.]

SOUTH AND CENTRAL AMERICA

Notes de Voyage dans l'Amérique du Sud. Argentine-Uruguay-Brésil. Par G. Clemenceau. 273 pp. Hachette et Cie, Paris, 1911. Fr. 3.50. 7½ x 4½. [The English Edition of this book was reviewed in the June *Bulletin*, pp. 455-6.]

Documentos relativos á la controversia de limites con la Republica de Panamá. 113 pp. Secretaría de Relaciones Exteriores. República de Costa Rica. San José, 1909.

The Antiquities of Manabi, Ecuador. Final Report. By Marshall H. Saville. 284 pp. Map, ills. Contr. to South American Archeology, Vol. 2. The George G. Heye Expedition. New York, 1910. 13 x 10.

Détermination de l'Altitude du Mont Huascaran (Andes du Pérou). Exécutée en 1909 sur la demande de Madame F. Bullock-Workman par la Société Générale d'Études et de Travaux Topographiques. Compte rendue de la Mission. 48 pp. Maps, ills. Henry Barrère, Paris, 1911. 15 x 11½.

AFRICA

La France et la Turquie dans le Sahara oriental. Par E. Rouard de Card. 55 pp. Maps. A. Pedone and J. Gamber, Paris, 1910. 10 x 6½. [The author is professor of law at the University of Toulouse. Since 1897 he has written much on the relations of France and Spain with the North Africa Countries. The present work is an historical relation of the expedition and operations of France and Turkey in the Eastern Sahara.]

ASIA

A History of Civilization in Palestine. By R. A. S. Macalister. Cambridge Manuals of Science and Literature. viii and 139 pp. Map, ills., index. G. P. Putnam's Sons, New York, 1912. 1s. 6½ x 5. [A very readable short history by the former Director of Excavations, Palestine Exploration Fund.]

Sport on the Nilgiris and in Wynaad. By F. W. F. Fletcher. xvii and 455 pp. Map, ills., appendices. Macmillan Co., New York, 1911. $3.75. 9 x 6. [A good account of the game animals and the chase in a large mountain district in the southwestern part of India, including the elephant, tiger, leopard, bison, bear, wild goat, sambur, deer, wild dog and other game. The book is especially noteworthy for its careful and interesting descriptions of the habits of the animals hunted.]

The Railways of Japan. 72 pp. Maps, ills. Director, General Administration Dept., Imperial Government Railways of Japan. Tokio. 10½ x 14½. [An official account of the railroads of Japan, with full text of the railroad law. Finely illustrated.]

Imperial Government Railways of Japan. (Also private Railways in Japan and the South Manchuria Railways.) Annual Report for the Year ended March 31st, 1909. 35 pp. of text. 136 pp. of tables and diagrams. Maps. Kondo Shoten Press, Tokyo. 12 x 8½.

Travels and Studies in the Nearer East. By A. T. Olmstead, B. B. Charles and J. E. Wrench. Vol. 1, Part II: Hittite Inscriptions. 49 pp. Ills. Cornell Expedition to Asia Minor and the Assyro-Babylonian Orient. Andrus & Church, Ithaca, N. Y. $1.50. 12½ x 9½.

AUSTRALIA

Die Totemistischen Kulte der Aranda- und Loritja-Stämme. II. Abteilung: Die Totemistischen Kulte des Loritja-Stammes. Dargestellt von Carl Strehlow. 75 pp. Ills. *Veröffentl. aus dem Städtischen Völker-Museum, Frankfurt am Main.* Joseph Baer & Co., 1911. Mk. 12. 11 x 8½

EUROPE

Europa's Childhood and Growth; an Historical Geography of Europe. By A. J. Berry. 281 pp. Ills. Sir Isaac Pitman & Sons, Ltd., London, 1912. 2s. 7 x 5. [A reader for young students.]

The Making of London. By Sir Laurence Gomme. 255 pp. Ills., index. Clarendon Press, Oxford, 1912. $1.15. 7½ x 5. [A lucid and able account of the evolution of London from prehistoric times, as very dimly revealed by finds dug out of London's site, to the present Empire City. The work is not only solid but also full of interest and information for the general reader.]

BUCKINGHAMSHIRE. By A. Morley Davies. xii and 222 pp. MIDLOTHIAN. By Alex. McCallum. x and 208 pp. NORTHAMPTONSHIRE. By M. W. Brown. xii and 215 pp. Maps and ills. in each. Cambridge County Geographies. G. P. Putnam's Sons, New York, 1911. 45 cents each. 7½ x 5 each.

DIE DEUTSCHEN ORTSNAMEN IM NORDOSTDEUTSCHEN KOLONIALGEBIET. Von Prof. Dr. F. Curschmann. Forschungen zur deutschen Landes- und Volkskunde, Vol. 19, No. 2, pp. 93-183. J. Engelhorn, Stuttgart, 1910. Mk. 5. 9 x 6½. [A study of place names in North East Germany from the earliest recorded German migration into that territory.]

THE RUSSIAN YEAR-BOOK FOR 1912. Compiled and Edited by Howard P. Kennard, assisted by Netta Peacock. xx and 822 pp. Map, ill. Eyre & Spottiswoode, Ltd., London, 1912. 10s. 6d. 8 x 5½. [The second issue of this year-book. This new source of information about Russia deserves the encouragement and support of all who are interested in the resources and activities of the Russian Empire. On p. 768 is a scheme of two alphabets for transliteration into English. Russia's trade is voluminously treated but not adequately as relates to the United States.]

PREHISTORIC THESSALY. Being Some Account of Recent Excavations and Explorations in North-Eastern Greece from Lake Kopais to the Borders of Macedonia. By A. J. B. Wace and M. S. Thompson. xv and 272 pp. Map, ills., appendices, index. University Press, Cambridge, 1912. 18s. 12 x 9½. [The volume collects all the archæological evidence as yet available for the prehistoric period in N. E. Greece.]

LA SISMICITÀ ALL' ISOLA DI USTICA E IL PERIODO MARZO-APRILE 1906. Per G. Martinelli. Estratto dagli *Ann. dell' Uffico* Centrale Meteorol. e Geodinamico Italiano, Vol. 30, Part 1. 16 pp. Ills. Giovanni Bertero, Rome, 1910. 13 x 9½.

CRIMEA. By E. N. Orlowska. In Russian. 211 pp. Map, ills. J. D. Sytin, Moscow, 1911. Ruble 0.50. 9 x 5½.

THE VOLGA. By A. Lepeszynski and B. Dobrynin. Edited by A. A. Kruber. In Russian. 279 pp. Map, ills. J. D. Sytin, Moscow, 1911. Ruble 0.50. 9 x 6.

PHYSICAL GEOGRAPHY

THE ORIGIN OF EARTHQUAKES. By Charles Davison. Cambridge Manuals of Science and Literature. viii and 144 pp. Maps, ills., index. G. P. Putnam's Sons, New York, 1912. 1s. 6½ x 5. [Considers the origin of different classes of earthquakes and fully describes one or two types of each.]

ROCKS AND THEIR ORIGINS. By Grenville A. J. Cole. Cambridge Manuals of Science and Literature. viii and 175 pp. Ills., index. G. P. Putnam's Sons, New York, 1912. 1s. 6½ x 5. [For the general reader. Tells about rocks in general, lists the common rocks that form them and has chapters on the limestones, sandstones, clays, shales, slates and igneous and metamorphic rocks. A useful little book. Those who read it carefully will find more intelligent enjoyment in observing rocks, whose study is an important branch of natural history.]

STUDIES IN TERRESTRIAL MAGNETISM. By C. Chree. Macmillan's Science Monographs. xii and 206 pp. Diagrams, index. Macmillan Co., New York, 1912. $1.60. 9½ x 6. [A book for the specialist, giving a connected account of this distinguished authority's own original work in Terrestrial Magnetism and referring to the work of others only as far as is necessary.]

PHYSICAL GEOGRAPHY FOR SOUTH AFRICAN SCHOOLS. By Alex. L. du Toit. xii and 250 pp. Maps, ills., index. G. P. Putnam's Sons, New York, 1912. $1.40. 7½ x 5½. [An excellent little work supplying a concise account of the processes of physical geography, the phenomena being especially illustrated by South African examples.]

GENERAL

DIE BERGZEICHNUNG AUF DEN ÄLTEREN KARTEN. Ihr Verhältnis zur darstellenden Kunst. Von Joseph Röger. iii and 80 pp. Ills. Theodor Riedels Buchhandlung, München, 1910. Mk. 2.50. 8 x 5½. [An interesting study of the development of the representation of mountain forms on early maps.]

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Auf Eisbären und Moschusochsen. Tagebuchblätter der Jagderlebnisse in Ostgrönland. Von Rudolf Kmunke. x and 122 pp. Map, ills. Wilhelm Frick, Wien, 1910. Mk. 10. 10 x 7½. [A spirited account of the author's hunting adventures in the waters of Greenland Sea and along the East coast of Greenland.]

The Sweet Potato. By B. H. A. Groth. *Contr. from Botan. Laboratory of the Univ. of Pennsylvania,* Vol. 4, No. 1. 104 pp. Ills. Univ. of Pennsylvania, 1911. 10 x 7.

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NEW MAPS

Edited by the Assistant Editor

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given except when region explicitly defined by title. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

Maps issued by United States Government Bureaus

U. S. Coast and Geodetic Survey

[N. B.—Only charts not enumerated in the Coast and Geodetic Survey "Catalogue of Charts, Coast Pilots and Tide Tables, 1911," listed here.]

Atlantic Coast

Monhegan Island to Cape Elizabeth, Maine. 1:80,000. 44°4′ - 43°31′ N.; 70°17′ - 69°18′ W. Chart No. 1205. March 1912. 50 cts.

[Covers, on the same scale, the greater portion of the region shown on Charts Nos. 105 and 106 without the shore topography, however.]

Chester River, Chesapeake Bay, Maryland. 1:40,000. 39°15.1′ - 38°57.4′ N.; 76°18.6′ - 75°55.0′ W. Chart No. 548. Feb. 1912. 50 cts.

James River, Chesapeake Bay, Virginia: Newport News to Jamestown. 1:40,000. 37°14.0′ - 36°52.5′ N.; 76°47.0′ - 76°24.5′ W. With one inset: Continuation of Nasemond River. 1:40,000. 36°52.7′ - 36°44.0′ N.; 76°35.7′ - 76°29.2′ W. Chart No. 529. Jan. 1912. 50 cts.

James River, Chesapeake Bay, Virginia: Jamestown Island to Jordan Point. 1:40,000. 37°20.4′ - 37°9.6′ N.; 77°13.7′ - 76°46.2′ W. With one inset: Continuation of Chickahominy River. 1:40,000. 37°26.0′ - 37°20.3′ N.; 77°2.5′ - 76°52.0′ W. Chart No. 530. March 1912. 50 cts.

James River, Chesapeake Bay, Virginia: Jordan Point to Richmond. 1:20,000. 37°25.6′ - 37°17.3′ N.; 77°24.5′ - 77°13.2′ W. With two insets: Continuation of Appomattox River. 1:20,000. (1) 37°17.5′ - 37°13.7′ N.; 77°24.5′ - 77°21.0′ W. (2) 37°33.3′ - 37°25.0′ N.; 77°26.6′ - 77°24.2′ W. Chart No. 531. April 1912. 50 cts.

Pacific Coast

Northern Part [of] Cook Inlet. [Mercator's projection: mean meridional scale 1:200,000.] 61°33′ - 60°8′ N.; 152°46′ - 148°58′ W. Chart No. 8553. Jan. 1912. 50 cts.

Bays and Anchorages, South Coast, Alaska. (1) Larsen Bay, Kodiak Island. From surveys in 1908. 1:20,000. 57°33¾′ - 57°30½′ N.; 154°6¾′ - 153°55⅘′ W. (2) Shearwater Bay, Kodiak Island. From a British survey in 1904. 1:15,000. 57°21.5′ N. and 152°49.5′ W. (3) Southern Part [of] Isanotski Strait, Alaska Peninsula. From a reconnaissance by U. S. Fish Commission. 1:40,000. 54°49′ N. and 163°21′ W. (4) Uyak Anchorage, Kodiak Island. From surveys in 1908. 1:20,000. 57°38′ N. and 154°1′ W. (5) Karluk Anchorage, Kodiak Island. From surveys in 1897 and 1908. 1:20,000. 57°35¼′ - 57°33′ N.; 154°32′ - 154°24′ W. (6) Anchorage and Mud Bays, Chignik Bay, Alaska Peninsula. From surveys in 1874 and 1906. 1:40,000. 56°17′ N. and 158°23′ W. Chart No. 8822. April 1912. 50 cts.

Philippine Islands

Central Part [of] Philippine Islands. [Mercator's projection: equatorial scale 1:800,000.] 15°0′ - 10°12′ N.; 119°0′ - 126°20′ E. Chart No. 4706. Feb. 1912. 50 cts.

Iloilo Strait and Harbor, Southeast Coast of Panay. 1:50,000. 10°49.7′ - 10°33.9′ N.; 122°26.7′ - 122°48.3′ E. With two insets: (1) Iloilo River. 1:10,000. 10°42.0′ N. and 122°34.5′ E. (2) Santa Ana Bay, West Coast of Guimaras. 10°32.5′ N. and 122°31.5′ E. Chart No. 4448. Feb. 1912. 30 cts.

Harbors in Illana Bay and Vicinity, South Coast of Mindanao. (1) Port Sibulan. Surveyed in 1908. 1:60,000. 7°33′ - 7°14′ N.; 122°47′ - 123°0′ E. (2) Port Baras. Surveyed in 1906. 1:20,000. 7°38′ N. and 124°1′ W. (3) Limbug Cove. Surveyed in 1909. 1:15,000. 7°28′ N. and 123°24′ E. (4) Port Sambulauan. Surveyed in 1909. 1:30,000. 7°35¼′ - 7°31′ N.; 123°19¾′ - 123°26′ E. (5) Pagadian Bay. Surveyed in 1909. 1:50,000. 7°49⅖′ - 7°43′ N.; 123°21⅖′ - 123°33′ E. (6) Maligay Bay. Surveyed in 1909. 1:50,000. 7°33′ - 7°26⅖′ N.; 123°9½′ - 123°20′ E. Chart No. 4652. April 1912. 30 cts.

U. S. GEOLOGICAL SURVEY

Maps Accompanying Publications

WYOMING. (a) Map Showing Location of the Potash-Bearing Rocks of the Leucite Hills, Sweetwater County, Wyoming. [1:257,000.] [42°0′ - 41°30′ N.; 109°22′ - 108°47′ W.]. With inset showing location of main map.

(b) [Nine maps entitled] Map showing the location and topographic relief of (1) Pilot Butte, T. 19 N., R. 106 W. [1:50,000]. [41°42′ N. and 109°13′ W.]. (2) Boars Tusk and Matthews Hill, T. 23 N., R. 104 W. [1:50,000]. [41°58′ N. and 109°5′ W.]. (3) the Badger Teeth, T. 21 N., R. 103 W. [1:42,000]. [41°49′ N. and 109°7′ W.]. (4) Cross and Osborn mesas and their relation to the lava-bowlder locality. [1:55,000]. [41°50′ N. and 109°4′ W.]. (5) Hatcher, Emmons and Zirkel mesas, Tps. 21 and 22 N., R. 102 W. [1:70,000]. [41°49′ N. and 108°55′ W.]. (6) Orenda Mesa, T. 22 N., R. 101 W. [1:50,000]. [41°52′ N. and 108°52′ W.]. (7) Black Rock Mesa, T. 22 N., R. 101 W. [1:42,000]. [41°53′ N. and 108°48′ W.]. (8) Steamboat Mountain, T. 23 N., R. 102 W. [1:50,000]. [41°59′ N. and 108°57′ W.]. (9) North Table and South Table mesas, Table Mountain, Iddings, Weed, and Hallock buttes, Endlich and Hague hills, and their associated dikes. [1:55,000]. [41°54′ N. and 109°0′ W.].

Pl. I and Figs. 1-9, "Potash-Bearing Rocks of the Leucite Hills, Sweetwater County, Wyoming" by A. R. Schultz and W. Cross, *Bull.* 512, 1912.

NORTH AMERICA

UNITED STATES

NEW YORK CITY. [Four maps of the boroughs of New York City, 1:33,600.] (1) Williams' Map of Boroughs of Manhattan and the Bronx. 7 colors. (2) —— of Borough of Brooklyn. 7 colors. (3) —— of Borough of Queens. 6 colors. (4) —— of Borough of Richmond. 6 colors. Williams Map and Guide Co., 218 Fulton St., New York, 1911. Price of pocket edition: maps (1), (2), and (4), 25 cts. each, map (3), 50 cts.

[Wax-engraved city maps of the usual type produced by commercial map-engravers, showing streets, railroad, street car and subway lines, etc. As usual in maps of this type built-up areas are not shown, nor is distinction made between existing and non-existing streets—the feature specially commending the map of New York City, reviewed in the *Bull.*, Vol. 43, 1911, pp. 795-796. What a city map should be can be seen by referring, for instance, to the map of St. Petersburg listed below under "Russia," or to the countless excellent city maps in Baedeker's guide books.]

CANADA

CANADA, ETC. (a) Canada: Map Showing Accumulated Temperatures (Degrees C.) between the Times when the Mean Monthly Temperature Curve Rises above 5° C. in Spring and Falls to 10° C. in Autumn. 1:20,000,000. 75° - 40° N.; 150° - 50° W. 1 color.

(b) Canada: Map Showing the Area within which the Temperatures are Sufficient for Wheat Cultivation. Same scale and approximately same coordinates as map (a).

Accompany "Climatic Limits of Wheat Cultivation, with Special Reference to North America" (first part) by J. F. Unstead, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 347-366.

[Map (a) gives equal temperature lines showing the total amount of heat available for wheat growing; map (b) shows the polar limit of possible wheat growing and indicates the excess or deficit of the accumulated temperatures as compared with those required for wheat cultivation. Map (b) shows, for instance, that, aside from the valley of the Peace River almost as far up as its issue from the Rocky Mountains, the valley of the Liard for 150 miles above, and the valley of the Mackenzie for 150 miles below Fort Simpson are still within the limits of successful wheat cultivation.

The paper on which the maps are based is exemplary in its geographic treatment of the topic.]

AFRICA

ANGOLA. Esboço da Carta de Angola. 2a Edição. 1910. 1:2,500,000. 4° - 19° S.; 10°40′ - 25°26′ E. 4 colors. In 2 sheets. Commissão de Cartographia (Lisbon), 1910.

[Valuable general map on relatively large scale. Representation of relief primitive.]

KAMERUN. Die Neugestaltung Kameruns auf Grund des Marokko-Abkommens. 1:2,500,000. 13° N. - 6° S.; 6° - 22° E. 10 colors. Dietrich Reimer (Ernst Vohsen), Berlin, 1911.

[Wall map with political coloring. Boundaries of territories of the French exploiting companies shown.]

KAMERUN. (a) Die Stromgebiete des Mungo, Wuri und Dibamba. 1:500,000. 5°19′ - 3°30′ N.; 8°46′ - 10°55′ E. 4 colors.

(b) Das Manenguba-Gebirge. Nach den Aufnahmen von Stabsarzt Berké, Dr. Esch, Hptm. Glauning, Prof. Dr. Hassert, Oberlt. Hirtler, Oberrichter Dr. Meyer, Oberlt. Rausch, Oberlt. Schlosser und dem gesamten vorhandenen Material bearbeitet von E. Lober unter Leitung von Max Moisel. 1:100,000. 5°7.5′ - 4°56.7′ N.; 9°46.3′ - 9°57.2′ E. 2 colors.

Karten 8 and 9, respectively, "Das Manenguba-Hochland: Ein Beitrag zur Landeskunde Kameruns" by F. Thorbecke, *Mitt. aus den Deutschen Schutzgebieten,* Vol. 24, No. 5, 1911, pp. 279-310.

[Maps of the usual excellence of German colonial maps. Relief in approximate contours and shading in brown. On map (a), which is an extract from Moisel and Sprigade's "Grosser Deutscher Kolonialatlas," boundaries of districts inhabited by native tribes are shown.]

Morocco. Höhenschichtenkarte des Atlasvorlandes von Marokko. Entworfen von Dr. Rudolf Zietz. 1:2,250,000. 36° - 31° N.; 10°0′ - 4°25′ W. 5 colors. Accompanies, as Taf. 48, note with same title by same author, *Pet. Mitt.*, Vol. 58, I, May, 1912, pp. 270-271.

[Valuable hypsometric map of the Atlantic coastal plain and piedmont region of Morocco. The choice of contours at an interval of 250 meters is better suited, the author says, to bring out the scarp fronts bounding the coastal plain and the piedmont region on their inner sides, which lie, respectively, at an elevation of 250 and of 750 meters, than the only existing hypsometric map of the region, that by R. de Flotte Roquevaire, with contours at 200, 500, and 1,000 meters.]

Morocco. [Four maps entitled:] Morocco to illustrate the paper by Alan G. Ogilvie. 1:7,500,000. 36¾° - 30° N. 10° W. - 0°. I. Geomorphology. 6 colors. II. Relief. Contours based upon particulars given in the map of Morocco in V. de St. Martin & Schrader's Atlas Universel de Géographie. III. Rainfall. After Th. Fischer (West of Atlas) and Bernard (East of Atlas). IV. a. Population (After Bernard's map compiled from estimates of Larras). b. Railways Suggested (mainly by Bernard). Accompany "Morocco and its Future" by A. G. Ogilvie, *Geogr. Journ.*, Vol. 39, No. 6, 1912, pp. 554-575.

[Cartographic epitome of the subject-matter of the excellent systematic regional treatment of Morocco which they illustrate. A more contrasting color scheme, especially in the case of map I, would have been preferable.]

ASIA

Chinese Empire. Sketch Map showing F. Kingdon Ward's Route through the Lutzu Country to Menkong. 1:500,000. 28°30′ - 27°57′ N.; 98°20′ - 98°55′ E. With inset, 1:30,000,000, showing location of main map. Accompanies, on p. 585, "Through the Lutzu Country to Menkong" by F. K. Ward, *Geogr. Journ.*, Vol. 39, No. 6, 1912, pp. 582-592.

[Additional contribution to our increasing knowledge of the constricted upper courses of the Salween and Mekong Rivers. Relief in wash, reproduced by half-tone process.]

Chinese Empire. Sketch map to illustrate the paper on Exploration in Mongolia and Dzungaria by Douglas Carruthers. 1:7,500,000. 58° - 39° N.; 70° - 112° E. 2 colors. Accompanies "Exploration in North-West Mongolia and Dzungaria" by D. Carruthers, *Geogr. Journ.*, Vol. 39, No. 6, 1912, pp. 521-554.

Dutch East Indies. (a) Zuidoostgedeelte van Soemba, Kleine Soenda-Eilanden. Sept. 1911. 1:100,000. 9°50′ - 10°25′ S.; 120° - 121° E. With three insets: (1) Watoe Liboe, Zuidkust Soemba. 1:20,000. [10°15′ S. and 120°35′ E.]. (2) Reede Benda, Zuidkust Soemba. 1:20,000. [10°12′ S. and 120°44′ E.]. (3) Reede Melolo, Noordoostkust Soemba. 1:20,000. [9°53′ S. and 120°41′ E.].

(b) Westkust Sumatra, Singkel tot Sibolga. 1:100,000. 2°18′ - 1°40′ N.; 97°40′ - 98°47′ E.

Charts Nos. 303 and 77, published by the Ministerie van Marine: Afdeeling Hydrographie, The Hague, 1911.

AUSTRALASIA AND OCEANIA

Victoria. (a) [Sketch map of the Yarra River and Dandenong Creek Basins, compiled chiefly from the county map of Evelyn]. [1:506,880]. [37°33′ - 38°0′ S.; 144°59′ - 145°33′ E.].

(b) [Outline of portion of the Yarra River east of Templestowe, showing the present and initial courses of the river, since the uplift of the Nillumbik Peneplain]. [1:120,000]. [37°41′ - 37°47′ S.; 145°7′ - 145°20′ E.].

(c) [Plan and section of the Yering Gorge]. [1:31,680]. [37°43′ S. and 145°20′ E.].

(d) [Geological map of the Yarra and Upper Goulburn Basins, taken from the geological map of Victoria, published in 1909 by the Mines Department]. [1:1,700,000]. [36°45′-38°5′ S.; 144°53′-146°40′ E.].

Accompany, as Pls. LXXXVI (incorrectly numbered Pl. LXXXVIII), LXXXVII, LXXXVIII (incorrectly numbered LXXXVI) and LXXXIX, "A Contribution to the Physiography of the Yarra River and Dandenong Creek Basins, Victoria" by J. T. Jutson, *Proc. Roy. Soc. of Victoria,* Vol. 23 (N. S.), Part II, 1911, pp. 469-515.

Victoria. (a) [Sketch map of the whole or parts of the Parishes of Nillumbik, Sutton, Warrandyte, Ringwood, Bulleen and Nunawading, compiled chiefly from the parish maps]. [1:170,000]. [37°39′-37°53′ S.; 145°7′-145°18′ E.].

(b) [Enlarged map of the Warrandyte goldfield]. [1:55,000]. [37°44′ S. and 145°14′ E.].

Pls. XCI and XCII, "The Structure and General Geology of the Warrandyte Goldfield and Adjacent Country" by J. T. Jutson, *Proc. Roy. Soc. of Victoria,* Vol. 23 (N. S.), Part II, 1911, pp. 516-545.

EUROPE

Belgium. Carte des Chemins de Fer, Routes, & Voies Navigables de la Belgique. 1911. 1:320,000. 51°30′-49°30′ N.; 2°30′-6°5′ E. 5 colors. Institut Cartographique Militaire (Brussels) 1911.

[Official railway map of Belgium. Areal tint to distinguish provinces.]

Belgium. Tableau d'Assemblage des Cartes de la Belgique avec liste alphabétique des noms des communes. 1:800,000. Institut Cartographique Militaire (Brussels), Feb. 1, 1912.

[Index map of the four standard topographic maps of Belgium on the scales, respectively, of 1:160,000, 1:100,000, 1:40,000 and 1:20,000.]

Germany. (a) Übersichtskarte des Eiderseengebiets. 1:200,000. 54°31′-54°4′ N.; 27°5′-27°55′ E. 5 colors.

(b) [Ten maps of individual lakes entitled:] Die Seen des Eidergebietes. Von Dr. G. Wegemann. 1:25,000. 6-19 colors. Location indicated on map (a). (1) Einfelder See. (2) Wittensee. (3) Ober-Eider See. (4) Borgstedterenge. Schirnauer See. (5) Audorfersee. (6) Westensee und Umgebung. (7) Flemhuder See. (8) Bistensee. (9) Brahm-, Warder-, Pohl-, Lust-See (Nortorfer Seen). (10) Borgdorfer See.

Taf. 37 and 38, "Die Seen des Eidergebiets" by G. Wegemann, *Pet. Mitt.,* Vol. 58, April, 1912, pp. 197-201.

[Map (a) shows districts without outlet, districts draining both towards the Eider and towards the Elbe and the divide of the Eider basin. The ten insets listed under (b) have brown altitude tints on land and blue depth tints to show the shape of the lake basins.]

Germany. (a) Verlauf der Endmoränen zwischen Storchnest und der Oder. 1:500,000. [52°0′-51°45′ N.; 15°42′-16°50′ E.].

(b) Verlauf der Lissaer Endmoräne von Dolzig bis zur russischen Grenze. 1:500,000. [52°15′-51°55′ N.; 17°0′-17°45′ E.].

Accompany, on pp. 62 and 69, respectively, "Über den Verlauf der Endmoränen bei Lissa (Prov. Posen) zwischen Oder und russischer Grenze" by J. Behr and O. Tietze., *Jahrb. der Kgl. Preuss. Geol. Landesanstalt,* Vol. 32, Part I, No. 1, 1911, pp. 60-75.

Germany. (a) Das Glimmerschiefergebiet von Ruhla. 1:25,000. [50°55′ N. and 10°23′ E.].

(b) Das Glimmerschiefergebiet von Brotterode. 1:25,000. [50°48′ N. and 10°28′ E.].

Taf. 2 and 3, "Über die Amphibolite des nordwestlichen Thuringer Waldes" by T. Lange, *Jahrb. der Kgl. Preuss. Geol. Landesanstalt,* Vol. 32, Part I, No. 1, 1911, pp. 1-52.

Russia. Plan of St. Petersburg. [In Russian.] [1:19,320]. 6 colors. A. Ilyin, Cartographical Establishment, St. Petersburg, [1911].

[Excellent plan of St. Petersburg showing built-up areas (public buildings differentiated), parks, fields, and street car lines.]

Switzerland. H. Kümmerly: Spezialkarte des Zürichsees mit Umgebung [in Reliefbearbeitung]. 1:50,000. [47°23′ - 47°8′ N.; 8°27′ - 8°58′ E.]. 4 colors. Geographischer Kartenverlag Bern: Kümmerly & Frey u. A. Francke. frs. 3.

[Excellent map with the superb plastic treatment of relief characteristic of the Swiss school of cartography, of which the publishers of the above map are the best exponents. Their chef d'œuvre is the official school wall map of Switzerland, 1:200,000.]

WORLD AND LARGER PARTS

Mediterranean Region and Near East. Philips' Map of Tripoli, Morocco and the Near East. [1:6,500,000]. 53° - 21½° N.; 16° W. - 40° E. 10 colors. With two insets: (1) The Dardanelles. [1:600,000]. (2) Morocco. [1:6,500,000]. 36½° - 28° N.; 11° W. - 1½° E. 3 colors. George Philip & Son, Ltd., London. Price 1/-.

[Usual type of map with political coloring.]

World. (a) Kartenskizze der Kontinentalschollen. [Mercator's projection: equatorial scale 1:250,000,000.]

(b) Verbreitung der abyssischen Sedimente (nach Krümmel). [Two hemispheres, 1:220,000,000.]

On Taf. 36, "Die Entstehung der Kontinente" (first part) by A. Wegener, *Pet. Mitt.,* Vol. 58, I, April, 1912, pp. 185-195.

POLAR

Greenland. (a) Sketch map of the area investigated [for plankton during the "Danmark-Expedition" of 1906-1908]. [1:5,000,000]. 78°30′ - 74°35′ N.; 24°30′ - 5°30′ W. Accompanies, on p. 335, "Marine Plankton from the East Greenland Sea: [Part] IV" by C. H. Ostenfeld and O. Paulsen, *Meddelelser om Grønland,* Vol. 43, 1911, pp. 318-326.

Greenland. Sketch-map of the east coast of N. E. Greenland between 80° and 81° N. L. showing the position and extension of the Carboniferous rocks. [1:2,300,000]. 81° - 80° N.; 20° - 12° W. Accompanies, as Fig. 1, on p. 339, "Contributions to the Carboniferous Flora of North-Eastern Greenland" by A. G. Nathorst, *Meddelelser om Grønland,* Vol. 43, 1911, pp. 339-346.

EDUCATIONAL

Europe. Philips' Comparative Series of Wall Atlases: Europe. Edited by J. F. Unstead, M.A., & E. G. R. Taylor, B.Sc. With explanatory handbook to teachers. George Philip & Son, Ltd., London, 1912. 21s. [Eight maps, 1:6,000,000, entitled:] (1) Relief of Land and Communications. 13 colors. (2) Political Divisions. 9 colors. (3) Climate: Summer Conditions. 8 colors. (4) Climate: Winter Conditions. 9 colors. (5) Temperature. 12 colors. (6) Natural Vegetation. 9 colors. (7) Economic. 6 colors. (8) Density of Population. 8 colors.

[An admirable series of wall maps both in content and in execution. An epitome, in cartographic form, of all phases of the geography of Europe, critically selected for educational purposes and drawn with the boldness of line essential in a wall map.

On map (1) seven tints, ranging from brown to green, are used to express elevation on land and three blue tints for the depth of the sea. Maps (3) and (4) show rainfall (six degrees) and prevailing winds for the six summer and for the six winter months (Nov. to April), respectively, as well as July and January isobars. Map (5) shows January and July isotherms on a relief map. Map (6) distinguishes between (a) ice desert, tundra and alpine flora, (b) coniferous forest, (c) broad-leaved forest and meadow, (d) evergreen trees and shrubs, (e) temperate grass lands, (f) semi-desert, (g) desert, (h) oases. Map (7) distinguishes between (a) industrial districts, (b) agricultural and (c) nonproductive regions and indicates by symbols the principal workings of coal and iron and the location of the principal agricultural products. Map (8) distinguishes between seven densities of population and indicates all towns having a population over 100,000.

This wall atlas is the first of a series in preparation which will include the five other continental divisions.]

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

Vol. XLIV **1912** **No. 9**

REPORT OF THE ERUPTION OF KATMAI VOLCANO*

Thursday, June 6th, was a clear frosty morning in Seldovia. Until about 3 P.M. the sky was cloudless and the air clear, the mountains across the Inlet showing plainly. There was no steam visible from Iliamna or Redoubt Mts.

During the forenoon, low deep reports as of distant blasting were heard and some people even then believed them to be volcanic. As the day passed the reports came oftener and louder, and next morning, Friday, June 7th, there was a slight fall of volcanic ash. The sky was overcast with peculiarly colored clouds and the explosions continued all day.

The morning of Saturday, June 8th, was much darker than usual, with a light S.W. breeze. At 6:10 A.M. the sky except near the northern horizon was overcast with one dull-colored cloud, under which were a few masses of mountain fog, tinted to a sickly yellow by the yellow light. The darkness increased and at 7:10 A.M. a fine dust began falling. Lights were necessary in the *Yukon* wardroom for two hours. The ash-fall gradually slackened and was over by 10 A.M. when about half an inch had fallen. The fine grit sifted everywhere like hard frozen snow and was hard on eyes and throat.

About 6 P.M. the S.S. *Dora* came into port with nearly a foot of coarser, darker dust on her decks. The *Dora* reported that when in Shelikof Strait they had seen a dense cloud rising from Katmai Volcano;† the cloud gained slowly all through Kupreanof Strait and overtook the ship when approaching Kodiak. Unable to make the

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*This report by Mr. I. M. Dailey, Assistant, Coast and Geodetic Survey, is printed in the *Bulletin* by courtesy of the Survey. It is dated at Port Graham, Alaska, June 20, 1912, and describes what Mr. Dailey observed during the eruption of the Katmai Volcano. Port Graham is about 140 statute miles in a northeasterly direction from Katmai Volcano and Seldovia is about fifteen miles further in the same direction. The two photographs show the depth of ash falling on Kodiak Island during the eruption.

† Katmai Volcano is about 60 statute miles, across Shelikof Strait, from the nearest point in Kodiak Island, and 140 miles from the town of Kodiak.

harbor, the *Dora* stood out to sea for fifteen hours of dust and darkness before coming to natural light.

During the evening the western sky was partly clear with long trails of rust-colored ashes or smoke stretching across toward the north from the dense southern sky. As the sun neared the horizon the trails changed to a dark red color which I had never seen in sunset sky before.

About 3 A.M. on Sunday, the 9th, a thick cloud slowly shut down from the south, and until after 5 A.M. there was inky darkness with a fall of ashes which, in lessening quantities, continued until nearly noon, when about three-quarters of an inch had fallen. All day Sunday was overcast and foggy, the air and land looking like a quiet, snowy day in the States. The explosions continued at irregular intervals all Sunday and Monday, but we did not hear any on Tuesday. There was no ordinary thunder at Seldovia, and no lightning, though boats on the Inlet on Friday night reported lightning rising

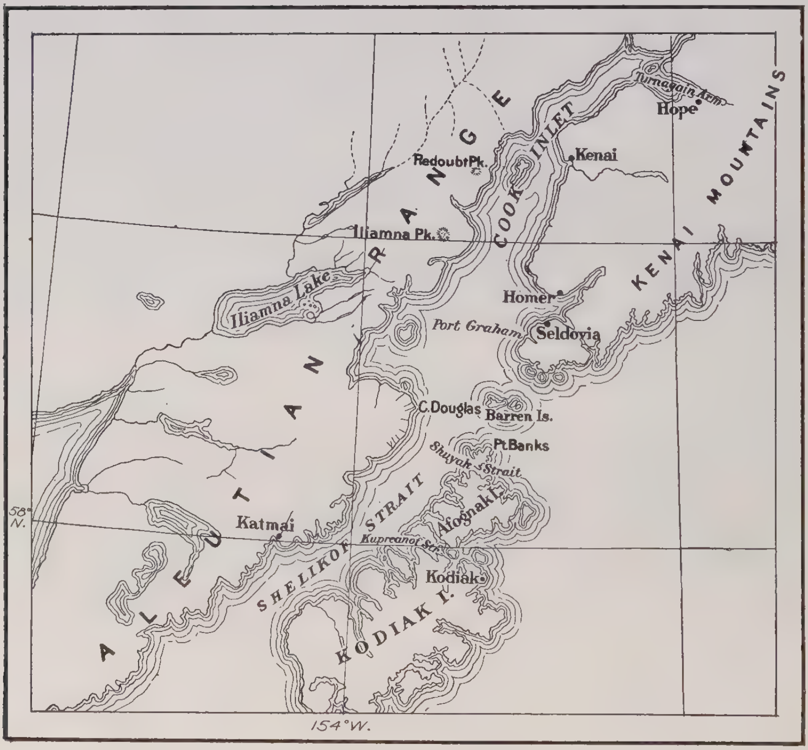

FIG. 1—Katmai and neighboring parts of Alaska.

from the water in the direction of the Barren Islands and natives from a fishing camp near Homer brought word that Mt. Douglas was throwing fire. The Seldovia dust was fine and light, and days after its fall the hill breezes carried it upward from the spruce, giving the impression of a forest fire.

Word was brought to Seldovia that Kodiak needed help and the *Yukon* arrived there on Sunday, June 16th. The town that was so fresh and green last Spring looked gray and desolate. The level gardens and potato patches were covered about eighteen inches deep. It was probably much deeper when it first fell, and judging from the trodden paths, will finally settle down to six or eight inches. In narrow valleys and at the foot of hills the dust was several feet deep. There had been light rain and the trees were weighted with white mud which looked like snow.

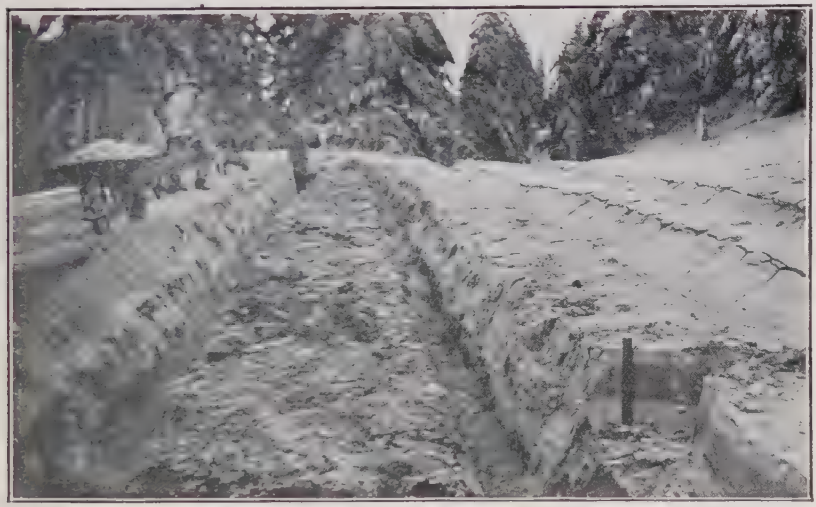

FIG. 2—After two weeks settling and packing by hard rains, the volcanic ash measured 10½ inches deep. Note three strata.

The people had shoveled paths from their doors and some of the more energetic had cleared their little gardens. Many cattle had been butchered to save them from starving, but green grass is appearing on the steeper hillsides and the cattle that were spared will be able to pick up a living. Wild land creatures are hungry; ravens were chasing parkie squirrels and even trying to kill young lambs. The lower strata or first fall was sand; and above this were the pink and white dusts as at Seldovia.

Kodiak people report sixty hours of darkness, with earthquakes, thunder, lightning and suffocating dust. Those who ventured out of doors wrapped wet towels about their heads. Most of the population took refuge aboard the revenue cutter *Manning*, whose officers report that in spite of four lines of hose playing and as many men as there was room for shoveling, they were barely able to keep the ashes from accumulating on deck. Owing to the location of the Kodiak wharf and wharf houses, vessels there got more than the fall in the open. The ashes at Seldovia and at Kodiak fell in a calm, but at Black Cape, where the *Yukon* anchored on account of rough weather, they had been driven with some force against the tree trunks and had adhered, making a sharp angle on the windward side.

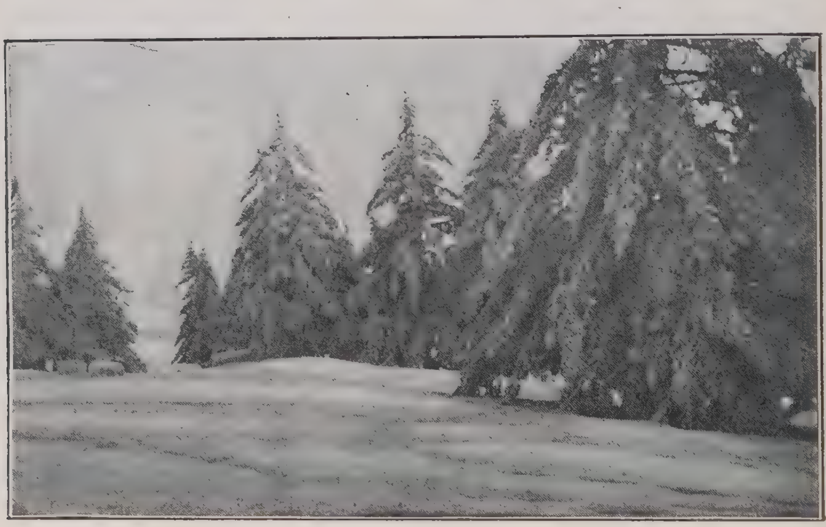

FIG. 3—Trees in front of the Mission covered with volcanic ash.

At Kodiak the lightning was described as moving slowly across the sky from the northward, like masses of fire dimly seen through the dust. The wireless telegraph house at the Wood Island station was burned. The rancher at Onion Bay reported lightning of similar character.

Westward of Shyuak Strait there were belts and patches of white water, caused by floating particles of pumice. Fishermen agree in saying that the salmon run in Shelikof Strait has practically stopped and the natives whose living almost depends on the salmon are wondering if they will come again when the water clears.

I. M. DAILEY,
Assistant, Coast and Geodetic Survey.

THE MISSISSIPPI RIVER FLOOD OF 1912

BY

ROBERT M. BROWN
State Normal School, Worcester, Mass.

Floods in rivers are annual occurrences. They are the result to a large degree of the changing seasons following the annual migration of the planetary wind belts. Floods in any one stream, however, vary in many ways, notably in height, in duration and in the time of the high stage season, during which they are dominant. It is necessary to realize in the first place, in discussing the great flood of 1912 in the Mississippi River, that a flood is a normal event in the river, and then to search for the variable features which have made a normal flood excessive.

As the Mississippi River drains a vast area and the headwaters of its tributary streams are in widely separated portions of the country, no one single flood, as a rule, passes down the trunk stream, but a series of flood waves which correspond to the spring rises in the different large tributaries. In consequence, the high stage of the river usually extends over a period of six months, from January to June inclusive. The Ohio, Missouri and the Upper Mississippi tributaries yield 63 per cent. of the total discharge of the river and are the prime factors to be considered. The Ohio district has its heaviest rainfall usually during January, February and March. Its large tributaries, the Cumberland and the Tennessee, rise in the southern Appalachians in a region of copious rainfall and add an enormous volume of water to the Ohio. The Ohio streams are in the track of the storms which come from the Gulf and although the entire basin of the Ohio River is less than one-half that of the Missouri, it furnishes over twice as much water to the Mississippi (of the 63 per cent., the Missouri contributes 14, the Ohio 31, and the Upper Mississippi 18).

The Missouri River basin has its rainfall in May and June and is the source of the late floods of the Mississippi. Although the Missouri has the largest drainage area of any of the tributaries, yet, because of the scant rainfall over the district and the small percentage of run-off, due to an absorptive soil, it is hydrologically the least important. The upper Mississippi River has its heaviest rainfall in May and June also and its rise unites usually with that of the Missouri. The ordinary sequence of floods is first the Ohio, then the Upper Mississippi, followed by the Missouri with the western streams. It is a common statement but well worth repeating that these streams have never been known to be in excessive flood at the same time. Such a coincidence would produce a discharge of more than 3,000,000 cubic feet per second, twice as large as has ever been observed.

The variable features in the Mississippi River floods are:

1. The amount of rainfall. Excessive rains are the prominent cause of all great floods. The 1907 flood was due to heavy rains in the Cumberland-Tennessee districts during January. The 1903 flood was caused by excessive rains during early March and the 1912 flood was the result of a succession of heavy storms during the last of March and early April.

2. The condition of the ground as to moisture. The most obvious example of this would be a rainfall of two inches extending over three days, which may produce only a very slight rise in a river, while the same amount in two hours may produce a very great one. A number of storms in rather rapid succession would have the same effect in increasing the percentage of run-off and this circumstance was the experience last spring.

3. Condition of the ground, whether frozen or vegetation covered. The run-off of the 1907 flood was high because the rain came during January when the ground was frozen. In general the Ohio floods come before the frost is out of the ground, so that a heavy rainfall is almost surely followed by a full stream. The question of the effect of the vegetation cover is a mooted one. M. I. Leighton believes that an increase in flood tendency has been caused to a great degree by the denudation of forest areas. On the other hand, Smith says* with considerable confidence that the question of increasing flood conditions and increasing low-water periods is fairly settled in the negative, so far as the available stream flow data can settle it.

4. The height at which the flood finds the lower trunk. The 1903 flood was emptied into the lower Mississippi at a time when the lower tributaries, such as the St. Francis, White, Arkansas, Yazoo and the Red Rivers, were at an extensively high state. A similar condition existed during the 1897 flood, which made the gage readings of the lower Mississippi stations for these two floods higher

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* J. Warren Smith. "The Relation between the Precipitation over the Watershed of the Ohio River above and the Stream-flow at Cincinnati." *Bull. 40, Weather Bureau, U. S. Dept. of Agric.*

than during any flood of the period 1882-1911. During the 1912 flood the lower river was at a high stage when the Ohio flood reached it and the gages of this flood were in excess of any which had been recorded.

5. The duration of the rise. The length of time which a flood is at or above the danger line determines in a measure the amount of territory that is threatened. A sudden rise up river flattens out as it proceeds down stream and thus a high stage of slight duration at Cairo may be insignificant when New Orleans is reached, while a series of rises up river tends to promote dangerous conditions in the lower river in counteracting the flattening tendency by additional volumes of water.

6. Local rainfall in the lower valley. Not only were the lower reaches of the Mississippi River in flood from the Missouri when the Ohio flood waters reached it, but the condition was aggravated this year by excessive rainfall, which in itself caused the towns of the lower valley to suffer because of the impossibility of draining off the surplus. New Orleans could not, for instance, take care of the rainfall when the high stages of the river were threatening the city with further disaster.

CONDITIONS CAUSING THE FLOOD OF 1912.

The precipitation during January and February over the greater part of the basin of the Mississippi was much below the normal. At Topeka, for instance, the January normal is .93 inch., the departure last January was — .79 inch, making an actual total rainfall for the month of but .14 inch; at Bismarck, the figures read, normal .54 inch, departure this year from normal, — .34 inch, actual precipitation .20 inch; at St. Paul, normal .90 inch, departure last January, — .38 inch, precipitation .52 inch; at Pittsburg, January normal, 2.87 inches, departure this year, — .97, actual precipitation 1.90 inches; at Nashville, January normal is 4.85 inches, departure this year — 1.93 inches, actual precipitation 2.92 inches. The only area not reporting a deficiency for January was a belt extending from Memphis to Indianapolis (Fig. 1). The snowfall in southern Illinois was heavy and Cairo's departure from the normal for the month was + .31 inch (in snow), making a total precipitation for Cairo for the month of 4.13 inches. During February a slight increase over the normal fell at Topeka (normal for February 1.44 inches, departure this year + .14 inch, actual precipitation for the month 1.58 inches). Practically no rainfall was reported for Bismarck (normal for February .52 inch, departure this year, — .42 inch, actual precipitation .10 inch), or for St. Paul (normal for February .87 inch, departure this year, — .80 inch, actual precipitation .07 inch); while Pittsburg (normal for February 2.75, departure this year, — .95, actual precipitation 1.80 inch) and Nashville (normal for February 4.46, departure this year, — .25, actual precipitation 4.21 inches) fell below the normal precipitation. The exception in the case of Topeka was caused by snowfall over Kansas and Nebraska. The snowfall on February 25th in Kansas was the heaviest since 1900, and the total monthly snowfall ranged from six to twenty-four inches. At the end of the month a considerable body of snow covered the ground from western Kansas to eastern Colorado, extending northeast to the Lake region (Fig. 2).

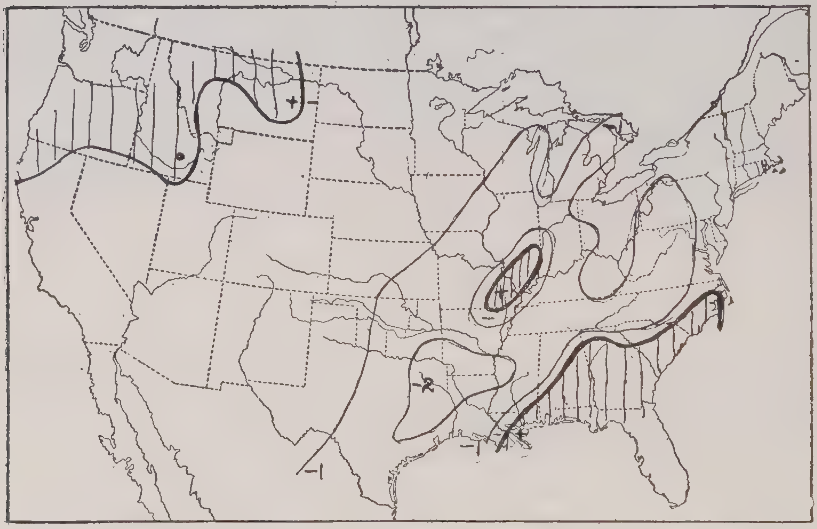

Fig. 1—Departures from Normal Precipitation for January. From No. 1—*National Weekly Weather Bulletin for 1912.* Heavy line mark the places of normal rainfall; shaded portions show excess (+); unshaded portions deficiency (–); light lines show amount of excess or deficiency, in inches.

During March and April, except in the north, where the deficiency of precipitation continued, an abundant rainfall was reported. The flood conditions were inaugurated in the Missouri basin, with Missouri, Iowa, Kansas and Nebraska under the cover of excessive snow. Early March added to the amount of snow on the ground and in Nebraska the monthly snowfall (March) was the greatest for at least thirty years. With so deep a snow cover at the end of the season, it is natural to expect high stages in the rivers because of the possibility of a rapid removal. Heavy rains and high temperatures during the middle of March melted the snow and caused unusually high stages on the lower Missouri, and this water caused a flood of moderate dimensions in the Mississippi. Following directly upon this, the excessive flood from the Ohio River came into the lower Mississippi.

In general, the rise of water from the Ohio begins early in January. In the 1907 flood the rise began as early as November 16, 1906. During 1912 the general deficiency of rain over most of the basin during January and February delayed the beginning of the Ohio flood. This flood is inaugurated by a southwest storm bringing heavy rains and high temperatures. Because of heavy snow in the Missouri basin and slight precipitation in the Ohio, the ordinary sequence of floods was changed, and instead of Ohio, Missouri and Upper Mississippi, the order this year was, Missouri, Ohio and Upper Mississippi. It is worth while to note in passing that the same conditions which caused the Missouri flood did not exist over the Upper Mississippi area, but in figuring flood possibilities it behooves us to realize that they could have existed without any record breaking precipitation in the north. The unusually dry winter over all the northern part of the country was providential from the point of view of the flood stages in the lower river.

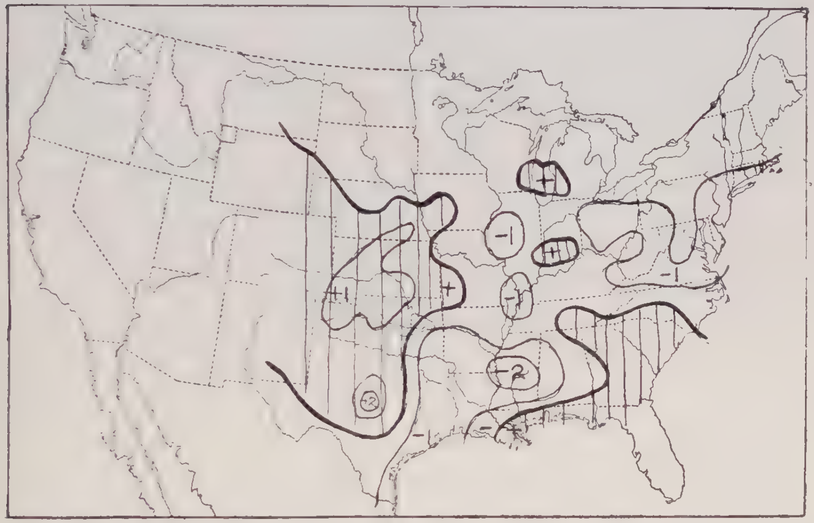

FIG. 2—Departures from Normal Precipitation for February. From *National Weekly Weather Bureau*, *No. 2*, *1912*. Heavy line mark the places of normal rainfall; shaded portions show excess (+); unshaded portions deficiency (–); light lines show amount of excess or deficiency, in inches.

The Ohio River began to rise after March 11, following the first of a series of southwest storms. This storm occurred on March 11-12 and it brought heavy precipitation throughout nearly the entire central and southern portions of the country. A second storm, March 14-15, moved over nearly the same course as the storm of March 11-12 and it was accompanied by heavy precipitation over most of the area. Following this storm the first warning was sent out on March 16, by the Weather Bureau. A third storm, March 20-21, was accompanied by moderate rains. At this time the Ohio River at Cairo had passed the 45-foot level. The entire Ohio was in flood, at Pittsburg the river was 6.1 feet above the flood stage. A fourth southwest storm set in on March 23-4 with unusually heavy precipitation and high temperatures, and a fifth on March 28-9 passed over the same area, again with heavy precipitation. At the end of the month, the highest stages of the river ever recorded were predicted between Cairo and Memphis; the water at Cairo was then at 51 feet, higher than during the 1903 and 1907 floods, and at Memphis, 38.1 or 3.1 feet above flood stage.

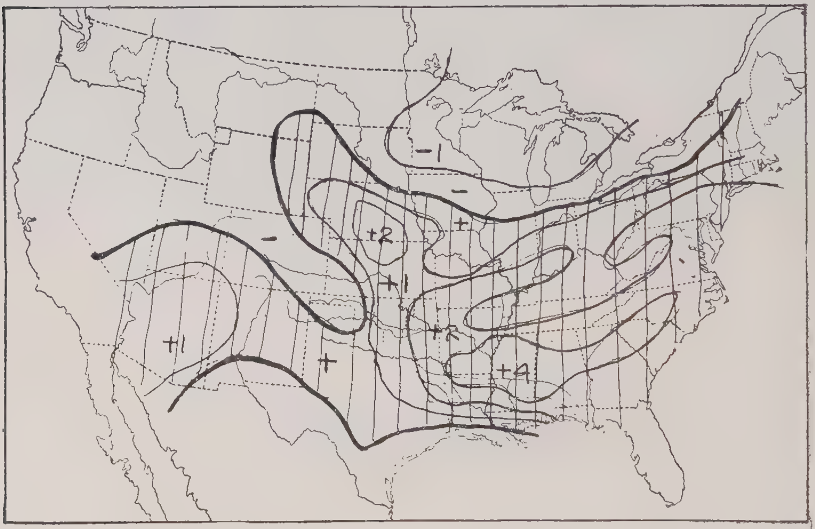

FIG. 3—Departures from Normal Precipitation for March. From No. 3—*National Weekly Weather Bulletin for 1912.* Heavy line mark the places of normal rainfall; shaded portions show excess (+); unshaded portions deficiency (–); light lines show amount of excess or deficiency, in inches.

Altogether the precipitation for March was far above the normal. At Memphis with a normal for March of 5.77 inches, the departure for the month was + 3.76 inches, making a total monthly rainfall of 9.53 inches, and at Pittsburg the excess was 1.82 inch. The excesses for the month over the area drained by the river were from two to five inches. (Fig. 3.) The rainy condition continued into April. On April 1-2 another southwest storm brought heavy rains. This was, however, the last of the series of storms which brought unusual rains and which easily account for the stages of the Ohio. The rapid succession of the storms made the extreme stages continue longer than usual by supplying a fresh burden of water and made the flood condition in the lower reaches of the river hazardous. It was not until May that New Orleans began to suffer, and on May 9, Governor Saunders of Louisiana sent out his appeal to the Nation to protect his State from flood. After the middle of April, rains began to be excessive again and now the lower river received the brunt of the storms. For the week ending April 22, 1912, the precipitation ranged from four to eight inches above the normal over the lower parts of the Mississippi Valley. Mobile for the week reported a departure of + 10.53 inches with a normal of 1.07 inch. The rains continued into May, and at New Orleans the rainfall on April 30 was 1.2 inch, on May 6, 2.44 inches, May 7, 1.06 inch, May 10, .76 inch, and May 11, 6.94 inches.

In summing up the reasons for the excessive flood, it is evident that very heavy precipitation over the Lower Mississippi and the Ohio valleys was the prime reason. The lateness of the Ohio rise, however, allowed the Missouri flood which came from the melting of a heavy snow cover to reach the lower Mississippi almost simultaneously with the crest of the Ohio flood.

SOME CONDITIONS DURING THE FLOOD OF 1912.

The complete data of the 1912 flood have not been issued at the time of this writing, but enough has been published to give a good basis for comparison with the floods of other years. The 1912 flood at nearly every station on the Mississippi exceeded the highest gage reading since 1871, when river gages were first established along the river. Thus at Cairo, the record was 54.00 feet, the highest previous being 52.2 in 1883; at Memphis, 44.9, the highest previous being 40.3 in 1907; and at Helena, 54.2 as against 51.8, the highest previous in 1897. Frankenfield* is authority for the statement that the volume of water of the 1912 flood was greater than that of the 1907 or the 1903 floods but less than that of the 1897 flood, and he has arranged the floods in order of volume of water, beginning with the greatest, thus; 1897, 1912, 1903, 1907. At Cairo, the 1897

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*H. C. Frankenfield. "The 1912 Floods in the Ohio and Mississippi Rivers." *Engineering News. Vol. 67, p. 747. Apr. 18, 1912.*

flood was above the flood stage (45 feet) 48 days, the 1912, between 40 and 45 days, the 1903, 25 days, and the 1907, 16 days.

The Mississippi River Commission has for a number of years adopted the policy of placing the grade of the levees at two feet above the estimated gage measurements of the highest flood. Thus for a while the provisional grade was two feet above the 1897 flood. Later the 1903 flood set a new mark and a grade two feet above the 1903 high water was made the limiting height of the levees. At Lake Providence, the 1903 water mark was two feet above the 1897; at Greenville, it was 2.4 feet above. Accordingly, the high water of 1903 reached to the top of the levees suggested after the 1897 flood and a new height two feet above the former estimated height was demanded. This latter height is about five feet above the provisional grade just before the 1903 flood. At Lake Providence and at Greenville these provisional grades have continued. The ultimate high water estimated by the Mississippi River Commission, based on the 1903 flood, was for Lake Providence 48 feet, and for Greenville 50.50 feet, which would place the levees at 50 and 52.50 feet respectively but in 1898 these were raised to 51 feet and 54.8 feet. The 1912 flood reached 48.25 at Lake Providence and 50.50 at Greenville, at almost the estimated figures. The loss of flood height due to the breaking of the levees and the release of water from within the levees is not considered. The estimated height will in all probability exceed the levee heights at these stations. At Cairo the highest previous record was in 1883 at 52.20, and the high water estimate was placed by the Commission at 54.17, which made the provisional grade 56.17 feet. The high water of 1912 reached to 54 feet at this station, and both Dabney and Frankenfield have estimated that the water would have reached the top of the provisional grade had not the levees in the locality given away and drained off a large volume of water. At Memphis, the water actually rose 3.3 feet above the Mississippi River Commission's estimate and overtopped the levees. The 1912 flood will cause the provisional grades for practically the whole reach of the river south of Cairo to be changed.

The efficiency of the levee system is the test of all the labor and the justification of the large expenditure. Efficiency may be measured in many ways. A comparison of the number of crevasses and the total number of miles of destroyed levees with the record of previous floods is the one in general use. During 1882, 284 crevasses were recorded and 59 miles of levee were destroyed. This record has been gradually improved. During 1890 only 23 crevasses were reported and 4.25 miles of levee were destroyed; during 1897, the number of crevasses increased to 49, with a loss of 8.3 miles of levee; during the 1903 flood, 9 crevasses of importance were recorded and 5 of these caused a loss of 2.1 miles of levee; and during the 1907 flood, the breaks were practically negligible. The 1912 flood found a passage through 22 crevasses, which aggregated not far from 22 miles in length.

From the analysis of the overflow made out by Dabney,* the conditions of some of the larger crevasses were as follows:

1. Upper St. Francis Basin, State of Missouri. Two breaks aggregating 22,000 feet occurred in levees that had been built by the county districts. The districts were protected by sack topping on the levees which were 4.5 feet below the standard grade, and the water stood 1.5 feet above the top of the levees when the break occurred. Practically all of the district of 700 square miles was flooded.

2. The Hickman break in Kentucky. The levee was three feet below the standard grade and the height had been increased by sack topping. The water was one foot above the levee when the break occurred. The break was precipitated by a wind storm which caused a wash and the sack topping was undermined. All of the 310 square miles protected by this levee was inundated.

3. The Lower St. Francis, State of Arkansas. Three breaks which flooded 2,500 square miles of territory is the record here. At all of these stations the levee was from one to three feet below the standard grade and at two the water was above the levee at the time of the break.

4. Ten breaks in the Louisiana districts flooded about 2,800 square miles of territory. In practically all of these cases the water stood below the top of the levee at the time of the break. The reasons for the breaks are given as sandboils in two cases, cuts in two cases and one case each of sloughing on landside, enlargement, unstable substrata, crawfish holes, cut for roadway improperly filled and overtopping. There is no doubt that the breaks in the levees and the consequent discharge of the water from the high water channel made a lower stage for this flood at all places in the river from Cairo south.

EFFECTS OF THE FLOOD.

The final estimate of the damage done by the 1912 flood cannot now be given, but certain approximations may be stated. Early in April, the Government estimated that the flood had already rendered

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* A. L. Dabney. "The 1912 Flood on the Lower Mississippi." *Engineering News. Vol. 67, p. 1121. June 13, 1912.*

30,000 people homeless and caused a financial loss of $10,000,000, but this was before Louisiana had suffered the flood ravages. Early in May, the Governor of Louisiana sent out his appeal to the nation and in it he stated that in his territory 350,000 people had been affected by the flood. In the northern parishes out of 125,000 affected, the government was caring for 30,000 and in the southern parishes approximately a quarter of a million people were in some way affected, of whom at least 100,000 people would suffer loss and probably 40,000 people would eventually have to be cared for by the Government before they were able to get back to work again on their lands. The estimated damage by inundation is given at $6,000,000 and this will be increased considerably if the water does not drain from the cultivable areas in time for the planting. The same source announced that the total loss of life in Louisiana had not exceeded 20 and in all cases the cause was accidental, only indirectly due to the flood conditions. In general the efficiency of the Weather Bureau in issuing flood warnings is so high and the value of these warnings has been so ably demonstrated in other years, that the loss of life is now practically reduced to zero, although, as is to be expected, the stress due to unusual and especially portentious conditions increases the liability of accidents.

The territory inundated according to Dabney's analysis was practically all of the Upper St. Francis district on the west bank of the river in Missouri, about 700 square miles; 11 square miles of the Cairo drainage district in Illinois; all of the Reelfoot district, 310 square miles, on the east side of the river in Kentucky and Tennessee; 80 per cent., or about 2,500 square miles, of the Lower St. Francis district on the west side in Missouri and Arkansas; 80 per cent., or about 730 square miles, of the White river district on the west side in Arkansas; 50 per cent., or about 1,300 square miles, of the Lower Yazoo district on the east side in Mississippi, and some 3,000 square miles of the Louisiana districts on both sides of the river. Many towns suffered in one way or another and among the settlements wholly or partially inundated was Columbus, Mo., Hickman, Ky., and Memphis, Tenn.

Whenever a great flood passes down the Mississippi River, the possibility of a greater is at once apparent. And as the settlements on the flood plain are tending to increase, partly because of the protection during periods of minor floods given by the levees and partly because of the confidence invited by the Mississippi River Commission, the problem grows yearly more and more intricate. Yet just so far as this confidence is expressed in settlements within the area liable to an overflow so much further must the levees protect beyond any chance of disaster. If we could count on compensating occurrences to arise at every bankfull stage, our levee system would be likely to be a safeguard against inundation, although the 1912 flood will, in a large measure, belie the contention. It is not to be expected that all the conditions favorable to floods should occur at once, but it is possible for them to do so, and the assertion is safe that unless the extreme volume of water which can be figured as a possibility in any Mississippi River flood can be cared for by the levee system alone, the public money should be turned to some more efficient means of protection. Just meeting the limit of strain or preventing a break only by excessive vigilance and energy or saving from disaster by some mitigating circumstance is not the end to be aimed at; but to be as reasonably sure as it is given man to be that an overflow cannot occur must be the plan. In many instances the limited area of rainfall has saved the levees; during 1903, the low stage of the river just before the flood was beneficial; during 1907, a cold wave came on and checked the rise in all the tributaries north of Cairo. The engineers of the first district labored with difficulty in almost continuous rains and prevented a break into the White River basin with great effort. Had not the weather turned cold on February 3d, they infer that in spite of their labors a break

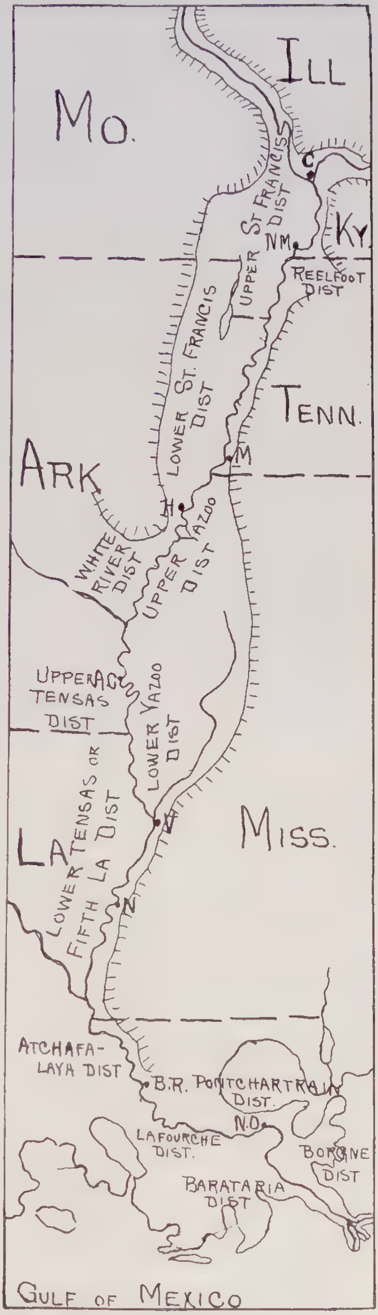

FIG. 4—Map of Lower Mississippi, showing locations of Levee Districts, and important points. C., Cairo; N. M., New Madrid; M., Memphis; H., Helena; A.C., Arkansas City; V., Vicksburg; N., Natchez; B.R., Baton Rouge; N. O., New Orleans.

would have occurred. As it was, the levees were topped. The arrival of the cold wave prevented a greater flood and furthermore so checked the supply of water that the flood was of short duration in the upper portions of the alluvial basin. In 1912, the abnormally low amount of precipitation which fell in upper Mississippi drainage area, and therefore the lack of an extra volume of water from a source which rarely fails, opens a possibility for the levee advocates to consider seriously.

TABULATED STATEMENTS.

1. Extreme stages during recent floods on the Mississippi River for eleven stations.

STATIONS	HIGH WATER OF THE YEAR (IN FEET)					
	1882	*1897*	*1903*	*1907*	*1912*	FLOOD STAGE
Cairo	51.87	51.67	50.60	50.30	54.00	45.00
Memphis.	35.15	37.66	40.10	40.30	44.90	33.00
Helena	47.20	51.75	51.00	50.40	54.20	42.00
Arkansas City.	47.10	51.90	52.90	52.10	55.40	42.00
Greenville.	41.68	46.75	49.10	47.30	50.50	42.00
Lake Providence. .	38.32	44.54	46.48	46.30	48.25	42.00
Vicksburg	48.75	52.48	51.80	49.60	51.90	45.00
Natchez.	47.75	49.82	50.35	48.90	51.40	. . .
Baton Rouge.	35.95	40.65	40.05	37.40	43.80	. . . .
New Orleans.	15.80	19.50	20.30	19.80	21.40	16.00

The 1912 flood furnished record heights at all the stations in the above table, with the exception of Vicksburg, where the flood height fell below the previous highest stage of 1897.

2. The present condition of the levee system, from the last Annual Report of the Mississippi River Commission (Fig. 4).

LEVEE DISTRICT	MILES IN SYSTEM	PERCENT. NOW BUILT	APPROX. AREA IN SQ. MILES PROTECTED
Upper St. Francis.	92.00	31.3	700
Lower St. Francis.	212.00	82.5	3,500
White River.	74.00	67.3	910
Reelfoot.	21.00	64.2	310
Upper Yazoo.	124.00	100.0	3,281
Lower Yazoo.	207.60	82.3	3,367
Upper Tensas.	192.90	81.0	2,500
Lower Tensas.	157.54	81.9	2,080
Atchafalaya.	127.22	87.2	6,085
Lafourche	82.23	85.5	. . . . .
Barataria.	71.88	73.3	2,020
Pontchartrain.	125.78	87.6	. . . . .
Lake Borgne.	78.10	75.6	1,816
Total.	1,565.25	81.7	26,569

The only district that was not inundated and the only levee reach which withstood the 1912 flood without a crevasse was the Upper Yazoo. This is the only levee district with completed levees.

3. Rainfall for January, February and March, 1912. From *The National Monthly Weather Bulletin, Weather Bureau* (in inches).

Stations	January		February		March	
	Normal	Departure	Normal	Departure	Normal	Departure
Vicksburg	5.67	—1.95	4.74	—2.04	6.25	+1.19
Little Rock	4.79	—1.25	4.34	—1.60	4.94	+4.11
Memphis	5.21	—1.80	4.49	—0.74	5.77	+3.76
Cincinnati	3.36	—1.15	3.33	—1.22	3.64	+1.09
Cairo	3.82	+0.31	3.44	—1.03	4.02	+1.27
St. Paul	0.90	—0.38	0.87	—0.80	1.60	—1.28
Lincoln, Neb.	0.62	—0.55	0.74	+0.57	1.33	+0.73
Wichita	0.77	—0.65	1.12	+1.20	2.25	+0.82

For the eight stations, the total departure for January was — 7.35 inches, for February, — 5.66 inches and for March, + 11.69 inches.

THE EXPEDITION OF THE ROYAL DANISH GEOGRAPHICAL SOCIETY TO ARABIA

PRELIMINARY REPORT

BY

BARCLAY RAUNKIÆR*
Copenhagen

On Nov. 12, 1911, I left Copenhagen for Constantinople, having been commissioned by the Royal Danish Geographical Society to make a reconnaissance journey in Northeastern Arabia. Through letters of introduction supplied by the Exploration Committee of that Society I received valuable support from the Turkish Government and from the Swedish-Danish representative, Minister v. Anckarsværd. I left Constantinople on Nov. 28 and crossed Asia Minor by the Anatolian and the completed portion of the Bagdad railroads. From Ulu-Kishla, which is the last station on the northern slopes of the Bulghar Dagh, I passed the Cilician Gates in three days, by carriage, went from Tarsus to the Mediterranean post of Mersine by rail and from Mersine to Alexandretta on a Russian steamer.

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* Mr. Raunkiær was known before this journey as a writer on the geography of plants and by his expedition to Central Tunis.

In Alexandretta the British Consul, Mr. Catoni, gave me useful letters of introduction to prominent persons in Haleb and Bagdad, and after a short stay, I proceeded to Haleb by carriage. I made my stay in the disagreeable winter climate of Haleb very short, and having in four days finished my preparations, I proceeded to Bagdad, for the most part following the western banks of the Euphrates. In the Euphrates Valley I made some investigations on agricultural problems such as had occupied me previously in Tunis. I spent Christmas Eve between Abu-Kemal and Ana and New Year's Eve in Ramadie, one of the last stations before Bagdad.

During my two weeks' stay in Bagdad I had much difficulty in finding an honest, English-speaking, Arab servant, but by help of the Swedish and French consuls I succeeded, and on Jan. 16, 1912, I started south on a "Lynch" steamer. In Basrah the Vali, his Excellence Hasan Risa Pasha, gave me a hearty welcome and supported my plans with the strongest interest and almost fatherly care.

After paying visits to the Russian Consul, Mr. Serge Tukholka, and to the American Mission, where I got some information about the country, I departed on Jan. 27 in a south-west direction to the little town of Zobeir. Here I stopped, as a protégé of the Vali, in the house of a rich Arab, Abdul Wahhab Mendil, and on the following day I proceeded with four pack horses on the two days' journey to Koweit. With the aid of my letters from the Turkish Government I was immediately received by Scheikh Mobarek and secured a room in his palace facing the sea. Here I lived for twenty-six days, occupied with difficult and patience-trying discussions concerning my further journey. At first, I was treated with very much distrust; but later, Mobarek, especially through the intervention of the British political agent, Captain Shakespear, was made to understand that I was quite neutral in regard to politics. Thereafter, the negotiations went on in a more friendly manner and concluded in the decision that my journey to Hofuf was to be made via Bereidah and Riadh in central Arabia.

Having been greatly assisted during my stay by Captain Shakespear and after being cured of a severe paroxysm of fever by the America medical missionary, Dr. Harrison, I left Koweit on February 24 with a merchant caravan of about 100 camels, bound for Nedjid. At that time the Emir of Hail was making war on the tribes in the Hadjara desert, and the direct Bereidah road along the

Wadi Rummah being too unsafe, it was decided to go by way of the well of Safah to Zilfi.

I had six camels and three Arabs with me. After nineteen days' journey through zones of clayey steppe, waste sandstone plateau and shifting sands, Zilfi was reached and two days later Bereidah. Here a murderous design against me was discovered at the last moment and the Emir himself, Fahad Ibn Ma'amr, received me in a very unamiable manner, starved me for two days and deprived me of my revolver and telescope, by a manœuvre easily seen through, the result of which was due to his power more than to his ability. He prevented my journey to Aneizeh and I was accordingly under the necessity of following Palgrave's route from Bereidah to Riadh via Zilfi and Medjma'a.

From Ghat, where another attempt on my life was made, the track mostly runs over the slightly elevated sandstone plateaus called Tuweik. From Bereidah to Riadh I traveled without caravan with my six camels and four men, having procured in Bereidah a man belonging to the Ima in Riadh. In spite of the fact that it was the task of this man to take me in safety to Riadh, the journey was nevertheless very adventuresome, for there were perils and among them an abundance of desert robbers. After a short stay in Riadh, where I was received with kindness and hospitality by the Imam Abderrahman Ibn Sa'ud, but, at the same time, held in close custody on account of the fanaticism of the people, I went on with a caravan, the main part of which was composed of about 150 pearl divers bound for Bahrein. These pearl divers were very insolent and hostile, and owing to the fact that the caravan did not carry any merchandise, they traveled very carelessly. The camp was pitched without the slightest caution, often in the most exposed places; no watch was kept during the night and it was due only to my own precautions that in the third night after Riadh, I was not assassinated by three Beni Murra Beduins.

After ten days' journey, following a track between Palgrave's and Pelly's routes, I arrived, on April 8, at Hofuf, where I was received with the most hearty welcome by the Turkish authorities. Being ill on account of drinking some very bad water on the way, I was anxious to reach the coast and I made my stay in Hofuf very short. Besides, I was still weak from some stomach trouble that had very much weakened me between Bereidah and Riadh. Having enjoyed the most grateful hospitality from the commandant, Abbas Hilmi Bey, I went on to Adjer, protected by an escort of fifty mounted Turkish soldiers. From Adjer I took an Arab sail-boat to Bahrein, whence I departed, after a couple of days' rest in the house of the British political agent, Captain D. Lorimer. I returned to Denmark via Bombay-Triest and arrived in Copenhagen on Sunday, June 2.

I carried out my work in accordance with the plan of the Committee, which was that, apart from a few questions of Mesopotamian agriculture, the journey of geographical exploration should begin at Basrah. Regarding the journey from Basrah to Adjer, I, of course, gave special attention to drawing a route map, which I constructed with the aid of the rates of marching and prismatic compass (or dioptric compass) bearings, the use of more complicated instruments being impossible owing to the hostility of the population. Even with the compass I had difficulties, but nevertheless I succeeded during the whole journey in taking my bearings every fifteen minutes with the exception of a couple of days between Medjma'a and Riadh, where a severe illness compelled me to take my observations with longer intervals. Topographical description ran parallel with the map-drawing. I have gathered much information concerning political questions, the caravan trade, periodical wanderings of the nomads, etc.

On the other hand, I have not brought home any botanical collections, although I was prepared to do so; the distrust and fanaticism of the population were insurmountable obstacles. For the same reason it was exceedingly difficult to take photographs, but by using different expedients, I was able, nevertheless, to secure a considerable number of photographs and drawings from central and eastern Arabia. Besides these results (to be published during the winter 1912-13) come the results of the investigations that were the main object of the journey: to carry out a geographical reconnaissance the results of which might serve as a base for future expeditions of the Royal Danish Geographical Society in Arabia.

SOME DETAILS OF MR. STEFÀNSSON'S GEOGRAPHICAL WORK

Late in August, word came from Mr. V. Stefànsson and Dr. R. M. Anderson, his associate, by way of Point Barrow and Nome, that they were returning from their field of ethnological and geographical research in northern Alaska, Northern Canada, and the southwestern part of the Parry Archipelago. Mr. Stefànsson returned to New York in September.

The Society recently received a letter from Mr. Stefànsson dated "Mouth of the Kugaryuak River (18 miles east of the Coppermine R.), Coronation Gulf, April 24, 1911," in which he gives the following summary of the results of some of his discoveries, and outlines his plans for the traveling season of last year:

"The Coppermine River at various points from fifty to seventy-five miles from the sea, has a width of no more than 135 or 140 yards. The average width is not much, if any, over 200 yards. The average width of Horton River, the same distance from the sea, is 350 to 400 yards, but the Coppermine is much the swifter stream and perhaps carries as much water as the Horton. In fact, the Coppermine is practically a continuous rapid for the lower seventy-five miles of its course, and broken ice is everywhere heaped in windrows. Ice cakes eleven or twelve inches thick and many square yards in area, in some cases, are piled into ridges in the manner of pressure ice on the unsheltered sea. Some of these ridges are fifteen to twenty feet high. Here and there are small stretches that have open water all winter. The current keeps them from freezing. The last open stretches in Horton River disappear in January. Compared with the Coppermine, the Horton is a good canoeing river—deep, free from rocks and with footing for "trackers" along its banks in most places.

"The most northerly trees (over five or six feet high) in the Coppermine Valley, as far as we know, are sixteen or eighteen miles from the sea; the most northerly sprigs of growing spruce are a mile and a half north of Bloody Fall, or less than six miles from the sea in an airline. To our surprise we found the other day a few small trees on the headwaters of the Kugaryuak, about twenty miles from the sea.

"The mouth of the Kugaryuak is about eighteen miles east of the most easterly mouth of the Coppermine. Its main branch comes from the southeast from an unknown distance. Its middle fork heads nearly south of the river's mouth about twenty miles inland. It is at the head of this branch that the trees are found. The Kugaryuak is about the size of the Dease or a trifle smaller.

"The ice in Coronation Gulf, west of Cape Barrow and south of the line of Cape Krusenstern, is in general level, though in some places there is a little rough ice even in apparently deep localities. On shoals there is, of course, pressure ice. The islands lie in regular chains—far more regular and far more numerous than our charts indicate. They vary from a fourth mile to five miles in length, but are of pretty uniform width—from a fourth to a half mile. The gaps between the ends of the islands vary from a few yards to three or four miles. The islands are in general of exactly the type of the hilltops in the ridges on the mainland both west and south of Coronation Gulf, precipices to the south and southeast, a twenty per cent. dip to the northwest or north; with talus slopes to the south and low beaches to the north. The chains have a general east and west true direction. Typically, the islands are of columnar basalt, their tops strewn with large and small boulders of foreign rock. In a few places we have found limestone strata in the faces of precipices.

"On beaches there is usually driftwood; enough for a one-night camp can be picked up on a half-mile of beach. Wood is always found chiefly on the northwest side of land (no doubt because all high tides are with northwest winds), a stick lodged by any other wind would be so low that the next high tide (the next northwest wind tide) would wash it off again. There is open water all winter in the narrows of Dolphin and Union Strait, just east of Lambert Island, caused by a strong current which generally, if not always, flows to the westward out of Coronation Gulf. That it is sometimes reversed I infer from the finding of a large (Mackenzie River?) cottonwood log on an island thirty miles east of the Coppermine River. This current and the fact that high tides come with northwest winds only, cause the coast from Cape Krusenstern to Back Inlet to be devoid of driftwood. The same causes make driftwood comparatively plentiful along the mainland shore of Dolphin and Union Strait and practically absent from the Victoria Land shore of the same strait.

"Some of the people we recently visited near Cape Barrow are in the habit of hunting in summer south to the woods on Hanbury's Cirk-i-li-nik River. We should retain on our maps the native names of places. The official maps of the Canadian Government and the British Admiralty are of no value to us in making inquiries about distant places, while the unpretentious maps in Hanbury's book are priceless to us through designating certain places by their native names. If it had not been for his map we might have supposed the Cirk-i-li-nik to be some small stream only a hundred miles or two from Cape Barrow, whereas it rises near Slave Lake and flows into Chesterfield Inlet.

"We have found that the Coppermine is roughly a dividing line between different kinds of caribou. On the Dease and in the Bear Lake woods, as well as on the Horton River and down on Cape Parry and Cape Bathurst, is found a larger, dark-faced, dark-legged and generally dark-skinned caribou with clean-cut head reminding one of the heads of horses; east of the Coppermine are light-haired, white-legged caribou, smaller, with short, donkey-like heads. This donkey-like appearance may be due partly to skeletal differences, but is probably caused chiefly by an abundant growth of hair on the face below the eyes. These white caribou are much easier to hunt than the darker ones. A few dark caribou are occasionally found east of the Coppermine R. among herds of light colored arrivals, and likewise a few light ones are found in herds of the darker caribou west of the river. Large herds of the lighter caribou are just now (and have been for two weeks) moving north across Coronation Gulf to Victoria Land.

"I have already written (*Bulletin, Amer. Geogr. Soc.*, 1911, Oct., pp. 771-775) of the possibility of finding evidence to show that some of Franklin's men survived for a time in Victoria Land. My work this spring had added nothing to the likelihood of this being discovered. The light beards, etc., become fewer and less pronounced as one goes east from the Coppermine towards Cape Barrow. We have been led to expect, however, that we shall find the European-like type stronger as we go north from the Cape Bexley people towards Walker Bay and beyond.

"For the present trip northward I have one companion, an Eskimo from Port Clarence, Alaska, called Natkusiak. We have one sled, six dogs, three rifles, 600 rounds of ammunition, some instruments, and provisions for two weeks. We expect to go up the west coast of Victoria Land as far north as it is inhabited, then cross to Banks Land, with those Eskimos who (we are told) hunt there in summer. If convenient we shall run up to the Bay of Mercy to see how everything is there. We then expect to spend the summer in Banks Land, perhaps going down to Cape Kellett in August on the chance of some whaler picking us up, for they often come near the Cape on their cruises for bowhead whales. If we do not see a ship, we shall try to reach Langton Bay by sled after Amundsen Gulf freezes—or rather, after the straits at the east end of the Gulf freeze—the Gulf itself probably never freezes permanently. As we go we shall buy a few of the more transportable, ethnological specimens we have a chance to get, make some small geological collections, and of course carry forward as best we can our routine work of investigation. We carry, too, a good supply of photo films."

THE SOCIETY'S TRANSCONTINENTAL EXCURSION

The European geographers, guests of the Society on the Transcontinental Excursion of 1912, began to arrive in New York about Aug. 12. They numbered, altogether, 43 persons, representing thirteen European countries and the leading geographical societies and universities. It is much regretted that Mr. Jules Leclercq, formerly President of the Royal Belgian Geographical Society, found it necessary to leave the Excursion at Chicago.

The names of our foreign guests, with their chief geographical positions, are given here. More extended allusion to them will appear in the account of the Excursion which will be printed after the return of the party:

AUSTRIA. Dr. Eduard Brückner, Professor of Geography at the University of Vienna; Dr. Fritz Machatschek, Privatdozent of Geography at the University of Vienna; Dr. Eugen Oberhummer, Professor of Geography at the University of Vienna.

BELGIUM. Paul Elsen, Member of the Royal Geographical Society of Antwerp.

DENMARK. Professor Ole Olufsen, Secretary of the Royal Danish Geographical Society.

FRANCE. Henri Baulig, Instructor in Geography, University of Paris; Albert Demangeon, Professor of Geography, University of Lille; Emmanuel de Margerie, Vice-President, Section of Historical and Descriptive Geography of the Comité des Travaux Historiques et Scientiques; Édouard Alfred Martel, late President, Commission Centrale de la Société de Géographie, Paris; Emmanuel de Martonne, Professor of Geography in the Universities of Lyons and Paris; Lucien Gallois, Professor of Geography, University of Paris; Antoine Vacher, Professor of Geography, University of Lille; Pierre Bastian, Student, University of Paris; Jacques Goubert, Student, University of Paris; François Herbette, Assistant in Geography, University of Paris.

GERMANY. Dr. Erich Von Drygalski, Professor of Geography, University of Munich; Dr. Fritz Jaeger, Professor of Colonial Geography, University of Berlin; Dr. Gottfried Merzbacher, Explorer; Dr. Joseph Partsch, Geheimrat, Professor of Geography, University of Leipzig; Dr. Alfred Rühl, Chief of Division, Oceanographical Institute, Berlin; Dr. Carl Uhlig, Professor of Geography, University of Tübingen; Harry Waldbaur, Student, University of Leipzig; Erich Wunderlich, Student, University of Berlin; Dr. Gustav W. Von Zahn, Geographical Institute, University of Jena.

GREAT BRITAIN. Henry O. Beckit, M.A., Balliol College, School of Geography, University of Oxford; George G. Chisholm, M.A., B.Sc. (Edin.), Lecturer on Geography, University of Edinburgh; Alan Grant Ogilvie, B.A., School of Geography, University of Oxford; Wm. H. Myles, M.A.

HUNGARY. Dr. Eugène de Cholnoky, Professor of Geography at the University of Kolozsvár; Count Paul Teleki, Dr. rer. polit., Honorary Secretary-General of the Hungarian Geographical Society.

ITALY. Dr. Olinto Marinelli, Professor of Geography at the Institute of Higher Studies, Florence; Professor G. Ricchieri, Milan, Professor of Geography at the R. Acad. Scientif. Letteraria; Dr. Cesare Calciati, Explorer.

THE NETHERLANDS. J. F. Niermeyer, Professor of Economic Geography, University of Utrecht; Dr. Karl Oestreich, Professor of Physical Geography, University of Utrecht.

NORWAY. Werner Werenskiold, Lecturer on Physical Geography, University of Christiania.

RUSSIA. Vladimir Doubiansky, Explorer, Conservator of the Imperial Botanical Gardens, St. Petersburg; Jules de Schokalsky, Professor of Physical Geography at the Académie Navale Nicolas and at the École Supérieure Pédagogique.

SWEDEN. Dr. Gunnar Andersson, Professor of Economic Geography at the College of Commerce, University of Stockholm.

SWITZERLAND. Émile Chaix, Professor of Economical and Political Geography at the University of Geneva and at the School of Commerce. Dr. Fritz Nussbaum, Instructor in Geography, University of Bern; André Chaix, Student, University of Geneva.

The American members of the Excursion number over sixty, only ten or twelve of whom are expected to be with the party for the entire trip. A list of the American members will be printed later.

The week before the excursion started west, on Aug. 22, was a busy, enjoyable and profitable time for the Society's guests. Through the courtesy of Columbia University, facilities for lodging the members were provided in Livingstone Hall. The House Committees of the University, Union League, Century and Harvard Clubs, and the President and Trustees of the American Museum of Natural History, kindly offered to the foreign members cards of temporary membership in those associations, during their stay in New York before the departure of the party.

A number of excursions under expert guidance gave the visitors much enjoyment. Prof. R. E. Dodge of Teachers College, Columbia University conducted a party on Aug. 15 to Washington, Conn., giving its members an opportunity to see the peneplain of southern New England and the activities of a dairying community.

On Aug. 16, Prof. Isaiah Bowman of Yale University took a party into Long Island as far as Far Rockaway, calling attention to the sharply defined southern border of the terminal moraine, the sand dunes and current action at Far Rockaway, other topographical and geological features, the market gardens near Mineola, etc.

On August 19 a party went to New Haven, where they were the guests of the Graduates' Club of Yale University at luncheon and later visited sedimentary beds, trap sheets, and other structural features, and observed the topographical aspects of the Connecticut Valley, under the leadership of Prof. Bowman.

A large party, under the guidance of H. B. Kümmel, State Geologist of New Jersey, and Richard R. Hice, State Geologist of Pennsylvania, on Aug. 19-20, visited an anthracite coal field of Pennsylvania. Stops were made at the Delaware Water Gap, Mt. Pocono and Scranton, where the party spent the night. At Scranton, the Board of Trade provided automobiles and the visitors inspected the surface workings of some of the coal mines. The principal geographical features seen on this excursion were portions of the terminal moraine of the last great ice sheet, the Triassic lowland, the maturely dissected, crystalline Highlands, a part of the Appalachian Valley, the Appalachian Plateau, and one of the anthracite coal basins.

On Aug. 21, all the foreign and many of the American members visited some of the most conspicuous downtown buildings in New York City, under the guidance of Dr. George F. Kunz. A complimentary lunch was served at the Whitehall Club, the observatory of the Weather Bureau on top of the Whitehall building was visited and some hours were devoted to a cruise through the harbor on a special boat.

A pleasant event of the week was a lawn party in honor of the foreign members at the residence of Mrs. Henry Villard, Dobbs Ferry-on-Hudson, on Sunday, Aug. 18. Dr. George F. Kunz conducted the party in a private car to Dobbs Ferry and the hostess and her friends made the occasion very enjoyable.

The excursion train left the Grand Central Terminal at 8.45 A. M. on Thursday, Aug. 22. The train consists of a baggage car, dining car, and four sleeping cars, containing about 90 berths in the sleeping sections, and 30 chairs in the observation parlors. As a rule, the excursion party numbers from sixty to seventy members. In the forward observation parlor is a library, the largest contributions to which are from the Director of the Geological Survey, including Survey Reports relating to the route, topographical maps of the route as far as published and the twenty-three geological folios crossed by the route. Other library material is provided, including reports and articles by American geographers and geologists or obtained from other sources.

A *Daily Bulletin*, containing the announcements and information of the day, is printed on the train. One of the most helpful features of the equipment is the "Guide Book for the Transcontinental Excursion of 1912," compiled by Prof. William Morris Davis. It is a little volume of 144 pp. issued in handsome and convenient form, with illustrations, by Messrs. Ginn & Co. of Boston, and their gift to the Excursion. It presents a concise, explanatory account of the larger physiographic provinces of the United States traversed by the Excursion and a more detailed statement of the local features seen along the route. A number of the specialists whose studies are cited or who have directly contributed to the preparation of the Guide Book are members of the Excursion for longer or shorter periods.

The staff of the Excursion is composed of the following gentlemen:

W. M. Davis, Director; Mark Jefferson, R. E. Dodge, I. Bowman, Marshalls; A. P. Brigham, Historian; Frank S. Churchill, M.D., Physician; N. M. Fenneman, Journalist; Lawrence Martin, Editor of *Daily Bulletin;* F. E. Williams, Librarian; W. L. G. Joerg, Assistant to the Director; Eugene D. Hussey, Excursion Conductor; Emmons J. Whitcomb, Assistant representing the Raymond-Whitcomb Co., Excursion Agents.

The following condensed itinerary will give a general idea of the route:

Aug. 22-23, New York, Albany, Utica, Syracuse, Ithaca, Rochester, ascending Mt. Beacon near Fishkill, with excursion to the Green Lakes from Syracuse; Aug. 24-25, Lockport, Buffalo, visiting the Lackawanna Steel Works, Niagara Falls, where over a day is spent; Aug. 26-27, Cleveland, Toledo, steamer to Detroit, Chicago, where a day is spent as guests of the Geographic Society of Chicago; Aug. 28-Sept. 2, Madison, Wis., with visit to the State University and automobile trip to the Driftless Area, Lake Pepin, St. Paul and Minneapolis, with local excursions as guests of the Twin Cities; Duluth, with local excursions, Fargo, Bismarck, Medora, with wagon-trip in the Badlands; Sept. 3-9, in Yellowstone National Park; Sept. 10-17, Bozeman, Butte, Spokane, local excursions in the Grand Coulée, Yakima Valley, with visits to irrigated fruit orchards, Seattle with local excursions, Tacoma, pass Portland in the night, the Dalles, return to Portland, Medford, automobile trip to Crater Lake, a day at Crater Lake; Sept. 18-27, Crater Lake to Klamath Falls by automobile, pass Mt. Shasta, three days in San Francisco with excursions to Mt. Tamalpais and the University of California at Berkeley, across the Sierras, two days in Salt Lake City, with excursions, Grand Junction with visit to irrigated fruit farms, Colorado Springs, a day in Denver; Sept. 28-Oct. 7, Parkdale, pass through the Royal Gorge, Pueblo, Raton, Santa Fé, petrified forest, two days at the Grand Canyon of the Colorado, Phœnix, with automobile trip to the Roosevelt Dam, Ash Fork, eastern Colorado and Kansas, Kansas City; Oct. 8-16, St. Louis, leaving in the night for Memphis, boat excursion to Helena, by rail to Birmingham, Chattanooga with ascent of Lookout Mountain, Asheville, Charlottesville, visiting the University of Virginia, four days in Washington, with excursion to the Great Falls of the Potomac as guests of the National Geographic Society, visits to scientific bureaus, institutions, etc.; Oct. 17, arrive in New York in the morning, meeting in the afternoon, reception in the evening; Oct. 18, meeting in the afternoon, dinner in the evening.

At various points along the route the excursionists are the guests of Boards of Trade or other public bodies, at dinners, receptions and excursions. Most of the European visitors will leave New York for home on the steamships of Saturday Oct. 19.

THE 1910 CENSUS OF THE POPULATION OF CHINA

BY

W. W. ROCKHILL*

The problem of the population of the world is still far from being reliably solved, and the determination of the approximate population of China is such an important factor in this problem that we must welcome the appearance of the first official Chinese attempt at a real enumeration of the population of the Empire, the results of which were published in February, 1911, in the Government *Gazette,* or *Chêng-chih-kuan-pao,* of Peking. This document, though showing complete ignorance of the methods now nearly universally followed in vital statistical reports, throws considerable light on the question of China's population, and seems entitled to more confidence than the enumerations which have heretofore appeared.

In 1908, when the Empress Dowager Tzu'u-hsi took the momentous step of promising the people a representative government, the need of a census became at once felt as it probably never had been before. When the Government decided upon convening Provincial Deliberative Assemblies it was found necessary to state in the Regulations governing the subject and approved by the Throne on July 22, 1908, that "the representation in the Provincial Deliberative

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* Reprinted from *T'Oung Pao*, Vol. 13, 1912, No. 1, pp. 117–125, Leyden.

Assemblies would best of all be arranged on a strict basis of population, but as China has not yet made a census and to begin making one now would consume too much time, the statistics of the literary examinations and the tax rolls have been taken as a basis for reckoning the number of Assembly members to assign to each province."

The necessity of making a census remained, however, of vital importance: the above makeshift could not be tolerated for long. In an Imperial Edict of Aug. 27, 1908, which laid down a detailed programme of measures to be carried through as indispensable prerequisites to the proclaiming of the promised Constitution in 1917, it was prescribed that in 1909 the Ministry of the Interior, with the assistance of Viceroys and Governors, was to begin taking a census by households (as had heretofore been done), and report the results to Peking in 1910. In 1911 a further census (by heads) was to be made and reported to the Government in 1912.

On the 27th February, 1911, the Ministry of the Interior reported to the Throne the first results, which were not as complete as it had been hoped they would be, for certain returns had not yet reached Peking at the time the report was made. This enumeration is the basis of the present enquiry.

The report is divided into two parts: in the first the population by "households," of which it distinguishes two kinds, "principal households" and "sub-tenant households,"* is given not only for each "whole province" separately, but in the case of certain organizations, such as the Banner Corps, the Metropolitan District (Shun-t'ien-fu), the city of Peking, and the Manchu garrisons in various cities of the Empire, the number of families composing them is also given. The second and more fragmentary part of the report on the population is evidently the early returns of the second census to be made in 1912, and complementary to that by households. It is to give (1) the number of the population by heads of adults, (2) of school children (6 to 16 years of age), and (3) of "able-bodied men," fit for military service (probably from 16 to 45 years of age), for the same divisions as used in the first part of the report. Although this second part is but a fragment, it enables us to establish the approximate numeric value of the average household (for we cannot ascertain the exact difference between a *chêng* and a *fu* household, though the latter must unquestionably be smaller than the former) in a number of provinces and localities scattered over

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[*] The only Chinese census prior to that of 1910, in which households are divided into two classes, *chéng hu* and *fu hu*, is that made by order of the Ministry of the Interior of the population of Peking, and published in the *Chén-chih-kuan-pao* of Sept. 1, 1908.

the Empire, and by applying these averages to the contiguous provinces or smaller divisions of the Empire, and to those among them which are known to be under similar geographic and climatic conditions, to arrive at probably a closer approximation of the population of the Empire than it has been possible to do with the data heretofore available.[*] These ascertained averages of the numerical value of the household (exclusive of infants below 6 years of age) are the following:

Chih-li	province	5.5	heads
Shan-hsi	“	4.2	“
Che-kiang	“	3.6	“
Ssü-ch'uan	“	4.0	“
Kuei-chou	“	5.2	“
Ki-lin	“	7.2	“
Hei-lung-kiang	“	3.1	“
Peking City		5.8	“
Shun-t'ien Prefecture (exclusive of Peking)		5.8	“
Manchu garrison of Canton		4.7	“
District of Kobdo		3.9	“

The mean average of the above is 4.8; this figure has been used in calculating the number of people in provinces to which none of the other averages could be properly applied. As regards the population of infants below 6 years of age, it has been assumed that the annual birth-rate in China cannot possibly exceed 1/100 of the total population, possibly less, in view of the apparent great numerical inferiority of females, and that the infantile death-rate must be as high, if not higher, than in those provinces of India about which we have trustworthy data—say between 40 and 45 per 1,000. On the basis of the population as furnished by the census we may assume that the infants under 6 years number between nine and ten millions.[†]

As regards the returns for the provinces of Ssu-ch'uan and Shan-hsi, they are incomplete, covering only 125 districts in the case of the former, and 87 in the case of the latter. I have accepted as correct the figures for the population of Ssu-ch'uan published in the *North China Daily News* of Shanghai on March 11, 1911, which says, on the authority of a Chinese newspaper whose name it does not mention, that Chao Erh-sün, Viceroy of Ssu-ch'uan, had reported to Peking that his province contained 9,205,200 families of 50,217,000 adults, 4,288,600 school children, and 8,669,000 "able-bodied men"—or 54,505,600 persons—infants excluded.

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[*] The figures of population by heads are the totals of adult males and females plus the school children; the "able-bodied men" are not counted as they must be included in the enumeration by male adults.

[†] A foreign physician of Peking with a very large Chinese practice told me a few years ago that, after several years of careful enquiry, he had reached the conclusion that the death-rate of infants in Peking was considerably over 50 per cent. of the births.

In the case of Shan-hsi I have found nothing better than to adhere to the total for that province given in my earlier study of the subject in 1905*, that is to say 10,791,000, and have, therefore, added a million to the recorded figure of the present census.

The population of the Empire (exclusive of Mongolia and Tibet), computed with the present available data and in the manner above explained, would appear to be, in round numbers, 325,000,000, as is shown in detail in Table 1 in which the figures obtained are compared with those reached by me in my earlier study of the question and there given as for the year 1885.

The present census supplies us with the number of people enrolled in the Manchu banner organization; it is 1,380,440 adults. If to this number we add the garrisons of Nan-king (Kiang-su), Chin-chou (Hu-pei), and Hang-chou (Ché-kiang), which are not included in the list, and which may roughly be put down at 5,500 families, or about 30,000 souls, infants included, and if we further add 40,000 infants to the recorded enumerated Manchu population, we reach a general total for the Manchu banners of 1,500,000 in round numbers.

The data now furnished us disclose an interesting and very important fact, if it should be corroborated hereafter; wherever the proportions of the sexes have been recorded the disparity in numbers is very great, males being largely in excess. In a few cases this excess of the male population may be explained by a recent influx of emigrants from other provinces of the Empire, as in the case of the two Manchurian provinces of Ki-lin and Hei-lung-kiang, or by the population being largely composed of troops, as in the case of Kobdo, or again by the locality in question being, as Peking, a great commercial center; but in others, and they are the more numerous, the disparity can only be explained by natural causes and conditions.†

Incomplete though the enumeration of "able-bodied" men is in the present report, it is of great interest to us, as it furnishes some idea of the relative proportion of this class to the whole male population. We are able to establish this percentage in the case of seven provinces; the mean average for this class in them is 40.20 per cent.

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* An inquiry into the Population of China. *Smithsonian Report* for 1904, pp. 659-678, Washington, 1905.

† Mr. Rockhill gives the divergencies in the sexes as recorded in the returns now supplied in Table II, which is not reproduced here.

of the total male population. In Japan in 1898, the latest year for which I have authentic data, the males subject to conscription, 18 to 41 years of age, formed 36 per cent. of the male population.*

We are furthermore enabled to gather some approximate idea of the proportion of children under sixteen to the total male population in at least seven provinces of the Empire, the same for which we have the population of able-bodied men.† In Japan the population below 15 forms about 33 per cent. of the total population; in the seven Chinese provinces for which we have data, the number of children from 6 to 16 varies from 6.22 to 11.86 in every hundred adults. If to this we add the children below 6, which we have been led to believe form about 3 per cent. of the population, we have a percentage of from 9.22 to 14.86 per cent. We must, of course, only accept these figures for China as interesting, but not well-authenticated data.

As regards the population of the city of Peking, the census taken in 1908 by the Ministry of Interior after the division of the city into the present 23 police districts, gave the numbers as 69,579 "principal households" and 56,429 "sub-tenant households"; 79,009 in the Tartar or Inner City, and 46,999 in the Chinese or Outer City. Computed on the basis of 5.8 heads to the family, as supplied us by the present census, we find that in 1908 the population of the capital (exclusive, of course, of infants) was 730,846, of which 458,252 were in the Tartar city and 272,594 in the Chinese. The present census gives Peking a total population of 805,110. In 1908 the number of children attending school in Peking was 16,282 boys and 771 girls. In 1910 the children of school age in Peking numbered 47,653.

The returns before us do not supply sufficient figures for computing the population of Mongolia, they only cover the Jehol district and the Ch'ahar tribe—the yu-mu or "nomadic herdmen" of Southern Mongolia from the Great Wall to Alashan and as far north as Outer Mongolia; we are told that they number 348,000 adults. The total Mongol population of the Empire is usually estimated as about a million and three-quarters.

Although the new information furnished us by the census of 1910 is insufficient to base any conclusions on, it tends, at all events, to confirm the opinion I had reached in my earlier study of the question that the population of the Empire is much smaller than we have been led to believe, and that in the last century it has been increasing very slowly, if at all.*

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* The various percentages of able-bodied male adults in China, as shown by the present returns, are given by the author in detail in Table III.

† These percentages are given in detail in Table IV.

TABLE I.

Estimated Population of China 1910.

PROVINCE	POPULATION 1910	POPULATION 1885
Chih-li	22,970,654	17,937,005
Shan-hsi	9,422,871	10,791,341
Shen-hsi	6,726,064	3,276,967
Kan-su	3,807,883	5,411,188
Shan-tung	25,813,685	36,545,704
Ho-nan	22,375,516	22,117,036
Hu-pei	21,256,144	33,600,492
Ssu-ch'uan	54,505,600	71,073,730
Kiang-su (including Kiang-ning)	15,379,042	21,259,989
An-hui	14,077,683	20,596,988
Kiang-hsi	16,254,374	24,541,406
Hu-nan	20,583,187	21,005,171
Kuei-chou	9,266,914	7,669,181
Yün-nan	8,049,672	11,721,576
Chê-kiang	13,942,655	11,684,348
Fu-kien	8,556,678	23,502,794
Kuang-tung	23,696,366	29,740,055
Kuang-hsi	5,426,356	5,151,327
MANCHURIA.		
Fêng-t'ien	5,830,819	....
Ki-lin	5,349,287	....
Hei-lung-kiang	1,562,254	....
TURKESTAN.		
Hsin-kiang (whole province)	1,768,560	....
TIBETAN MARCHES.		
Marches of Ssu-ch'uan and Yün-nan	195,496	....
TOTAL	316,817,750	377,636,198
Infants under 6	9,000,000 (?)	....
Mongolia	1,800,000 (?)	....
Tibet	2,000,000 (?)	....
TOTAL	329,617,750	

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* See Walter Francis Willcox. The Expansion of Europe in its influence on population, 1906, pp. 55–57, 66–70. Reprinted from *Studies in Philosophy and Psychology*, a commemorative volume dedicated to Prof. Charles E. Garman of Amherst College.

LIFE ALONG A GRADED RIVER

BY

F. V. EMERSON
University of Missouri

The Missouri River, rising in southwestern Montana, joins the Mississippi a few miles above St. Louis after flowing a distance of about 2,340 miles. In this distance the river falls 4,000 feet, with an average fall of 1.7 feet per mile. For much the greater part of its course the fall is much less. From Great Falls, in Montana, about 2,000 miles from its mouth, the average fall is less than four inches per mile, a fall which decreases down stream until near its mouth the fall is scarcely more than an inch per mile. (Fig. 2.)

The Missouri drains about 527,000 square miles. Much of this drainage area is covered with fine soil. Consequently, the river carries a heavy load of fine sand and silt, a load that is reflected in its Indian name of the "Big Muddy."

With its low grade and heavy load this river in its lower course has ceased to be a degrading stream.* The current in the lower two-thirds of its course rarely, if ever, flows upon a rocky bed, but rather on alluvium often 100 feet in thickness. From Montana to its mouth the present river is essentially a graded stream.† The stream meanders in a steep-sided valley trough from one and one-half to seventeen miles wide, and, except where the river touches the bluffs on either side, the main stream activity consists in reworking its own load, now depositing the load and again picking it up and carrying it a short distance down stream. Owing to the melting of snow in its upper basin and to the spring rains in its lower basin the river is subject to spring floods that often cover the valley bottom from bluff to bluff. During such times, the augmented current works with renewed energy in the soft materials of the flood plain, and changes in the river course are then most frequent. At such times the river frequently changes its channel, forms and destroys bars and islands, and cuts across the spurs projecting into meanders, thus shortening its course.

All these conditions affect in a marked degree the life of the people living on the river flood plain. The "river bottom folks" have special problems which grow out of their physiographic environment. The study of their geographic responses which constitutes the subject of this paper was made during a trip along a short stretch of the river. It embraces the river portions of Carroll, Saline, Chariton, Howard, Cooper, Boone and Moniteau Counties. (Figs. 1 and 3.) The conditions in this stretch of the river are typical of those along the entire graded stretch.

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* This expression means, in physiography, a stream that reduces or wears down a land surface.

† That is, it no longer very actively builds up or wears down its course.

Navigation. The first response, in chronological order, made to the river was navigation. The river afforded at all times of the year an easy, if treacherous, waterway for canoes and boats of light draught. The flood plain did not become an important land highway, although portions of it were used. The flood plain was often wet and heavily forested while the prairies a few miles back from the river were smooth and generally not in forest. The principal routes, therefore, especially after stage routes were established, were generally on the uplands. As in nearly all settlements of a new area, the hunter and trapper were the first visitors. The names of French origin which nearly every important tributary bears, show the influence of the French explorers. But the French were adventurers or hunters, and they left little permanent imprint on the region. The earlier settlers, and, in fact most of the later ones,

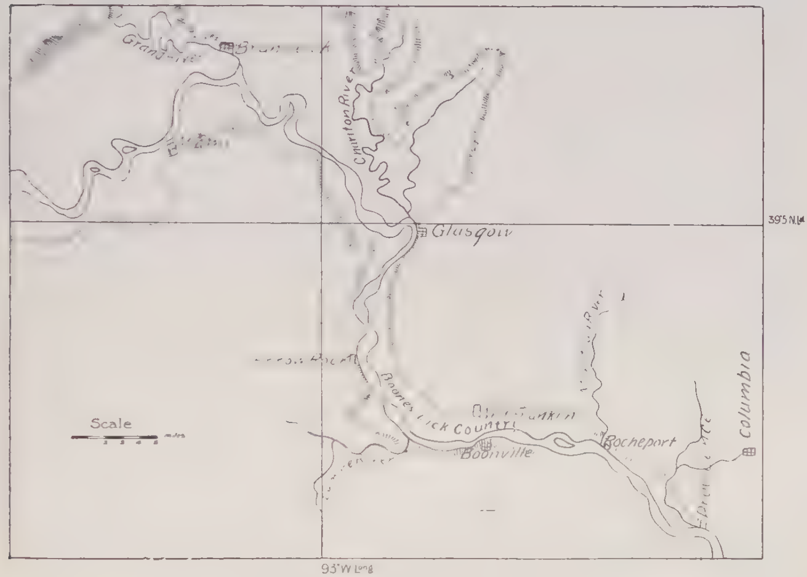

FIG. 1—Map of a part of the Missouri River.

were largely from Kentucky, Tennessee and Virginia. The easy waterway down the Ohio and up the Mississippi and Missouri offered a direct, easy passage to Missouri, whose climate was not unlike that of the home states.

With the advent of the steamboat, about 1819, began a river traffic which expanded to large proportions and declined only when the river was paralleled by railroads. This traffic was of the utmost importance in the settlement of Missouri and of the entire northwest. It early fixed a relatively dense population in a narrow zone along the river. (Figs. 4 and 5.) An interesting outgrowth of this population zone is seen in the educational institutions of Missouri, aside from the Normal Schools, which schools were established relatively recently. (Fig. 6.) Their proximity to, and parallelism with, the river is a striking response to the river influence.

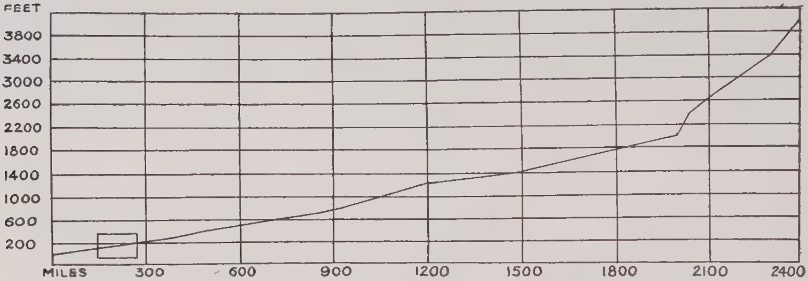

FIG. 2—Profile of the Missouri River from Three Forks, Montana, to its mouth. The square indicates the region described in this paper. From "Profiles of Rivers in the U. S.", by Henry Gannett. *Water Supply and Irrig. Papers*, No. 44, 1901.

The steamboat captain found the Missouri a treacherous and changeable stream, as, indeed, a graded river must necessarily be. Bars and channels shift and the steamer is liable to run into a sand bar. If this happens when the water is falling, the boat may be held for a year or more in the sand until high water will float her off. If the boat sinks, the hull is often filled with fine sand and she cannot be raised or her cargo rescued. Often a shifting of the river channel will leave a sunken boat inland and the cargo and machinery can be dug out. But the accident most feared was collision with sunken logs and stumps, snags, as they are called. In 1819 the *Thomas Jefferson,* carrying a Government exploring party, was the first to be sunk by a snag. During the following seventy-eight years, 193 sunken boats, or 67 per cent. of all wrecks, were due to snags.*

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*Causes of wrecks in the Missouri River and their number from 1819–1897: Snags, 193; Fire, 25; Ice, 26; Rocks, 11; Explosion of Boiler, 6; Sand bars, 4; Collision with bank, 1; Storms and wind, 2; Collision, 1; Overloading, 1; Swamping in violent eddy, 1; Unknown, 14. From the *Annual Report of the Missouri River Commission, 1897, p. 3870.*

It follows that one of the most important Government activities in improving the river consists in removing these snags. Snag boats patrol the river especially at low water, when the snags can be more easily observed. The snags are either sawed off or torn out. The bottom lands, if undisturbed, are soon covered with a timber growth, as, indeed, are also the enclosing bluffs. Trees, logs and stumps are thus readily taken by the current and become embedded in the sand of the channel, where they are the dreaded snags which no pilot can foresee.

Despite the dangers of navigation, the traffic was profitable. In the days of the north-west fur trade, boats not infrequently cleared $50,000 for their owners in one trip. The river traffic developed in the pilots a remarkable class of men. They knew the entire course with wonderful accuracy. Light-houses were not then established, and at night pilots could infer their position by the reverberations of their whistles from the bluffs on either side. The pilots often received a salary of $300 per month.

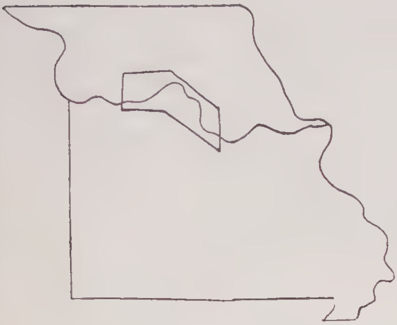

FIG. 3—Shows the area described in this paper.

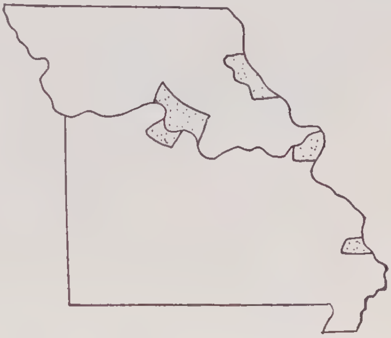

FIG. 4—Population of Missouri in 1830. Dotted areas have density of 10 to 20 per square mile. Density less in the rest of the State.

Settlement. The "Boones Lick Country" (Fig. 1) early drew immigrants. The river in this locality is eroding its southern bank, and has a flood plain between the stream and the northern bluffs two miles or more wide and nearly twenty miles long. Immigrants to central Missouri made this region a resting point from which they could determine their future location.

The river bottom soon became relatively densely settled, but the early settlements did not spread to the adjoining prairies for several reasons. Most of the settlers were used to a wooded country like the bottoms, and believed that prairie lands which would not raise timber must be worthless. It was not for several years that the experiment of wheat growing was tried on the prairies. An enterprising pioneer broke a small patch of prairie and sowed about three pecks of wheat and was astonished at a yield of 20 bushels.

The timber afforded materials for the cabins, and land did not seem worth the trouble unless it must be cleared first. The rushes growing on the wet lands remained green in their lower portions during the winter and afforded pasturage during that season, while the nettles growing on the low bottoms near the river gave fibre from which clothing was made. Moreover, there was constant danger from Indians. The river afforded easy communication in such cases and the prairies were not only at a considerable distance, but were separated from the river bottoms by a belt of maturely eroded country, the "rough country." This "rough country," besides being difficult to traverse, gave opportunities for ambuscades.

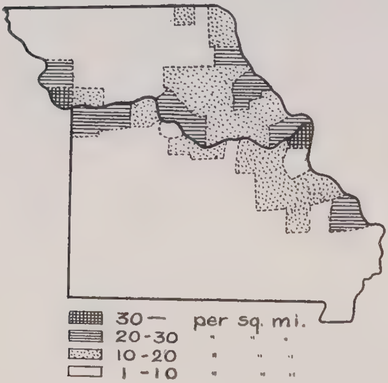

FIG. 5—Density of population in Missouri in 1850.

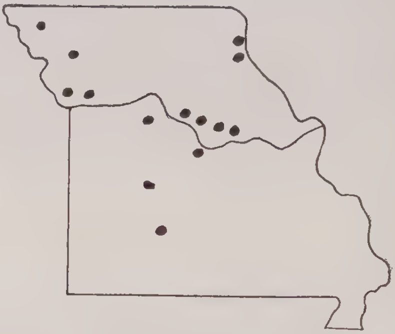

FIG. 6—Location of leading schools in Missouri.

The growth of towns. Naturally, at such a focus of travel as the Boones Lick Country, a town sprang up. In the location of their town the settlers showed their unfamiliarity with the habits of a graded river. Franklin was built in a low portion of the flood plain where the river was narrow and the passage, therefore, was short. (Fig. 7.) The town was laid out in 1817 and at once became a distributing center for a large region, and the seat of a Government land office. Four or five years later a caravan was fitted out for the Santa Fé trade, which soon attained large proportions, and Franklin became the starting point of caravans.

The existence of Franklin, however, was brief. In about nine years, at high floods, the banks began to cave into the river. The settlers had believed that the interlacing tree roots would preserve their lands from the lateral planation of the river. The river continued its encroachment and, in 1832, the citizens abandoned the town. Some moved to the bluff across the river where the town of Boonville was springing up. Others, learning the lesson, moved their goods and often their houses, about two miles back to the bluffs, where they built the town of New Franklin. (Fig. 7.) The site of Old Franklin is now nearly submerged. Other and less important towns along the river were built on the flood plain with the same disastrous results.

Settlements spread rapidly up the river, but were for years largely confined to the flood plain. The narrow strip of flood plain enclosed on one side by the river and the other by the bluffs became nominal geographical units and were often called by the name of some early or prominent settler. For example, the flood plain north of Arrow Rock was called "Cox's Bottom."

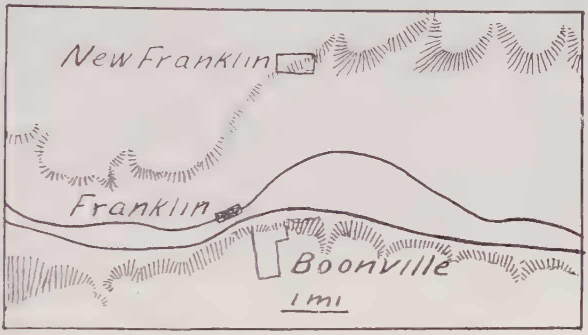

Fig. 7—The neighborhood of Franklin. From the Boonville sheet U. S. Geol. Surv. The site of Franklin is now largely covered by the Missouri.

Towns sprang up along the river. Many were laid out on the flood plains, but were soon abandoned. There was the menace of the fate that befell Franklin, and also the danger and inconvenience from recurrent floods. Moreover, the flood plain dwellers were subject to frequent attacks of malaria, and this alone caused the abandonment of several towns.

From the founding of Franklin in 1817 it required nearly twenty years for the settlers to learn the proper relation between the habits of a graded river and the best location for town sites.

Wherever a meander touches the limiting bluffs of the valley, or the river swings against them, is a favorable town site. A glance at Fig. 1 will show that, almost without exception, the principal towns along the graded portions of the Missouri and Mississippi have this location. The swiftest current in a meander swings against the outer shore of the meander, thus bringing deep water and easy landing for boats near the shore. The bluffs and adjacent higher ground afford easy drainage and sewerage, and are not subject to flooding.

Arrow Rock (Fig. 1) has a favorable location, and a trading post was established there as early as 1807. The location of this post was partly in response to a ferry at that point. The post, however, did not grow to importance. Miami, with its fine location, was the site of an Indian village. It became a prosperous town, and for a time was the terminus of a packet line to St. Louis.

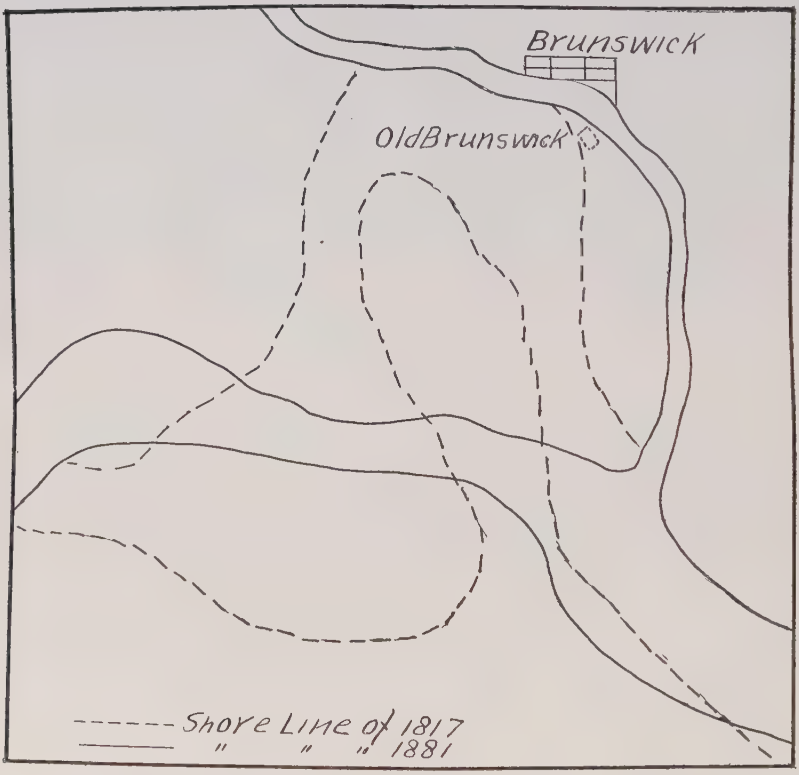

FIG. 8—Showing the Missouri River near Brunswick. From *Rept. on Survey of the Missouri River, Appendix 5, 1881.*

At several points along the valley, not only does the river swing against the bluffs, but at such a point there is an important tributary stream which gave easy access to the country at a considerable distance from the river. Almost invariably a town grew up at such localities. Warehouses were built at Providence at the mouth of the Perche. At the mouth of the Moniteau Creek, trade was brisk as early as 1820. In 1804 the Lewis and Clark expedition camped here. Soon the town of Rocheport was founded and boat-building became an important industry.

The two most important towns in this area were Brunswick and Glasgow. Both were laid out in 1836. Both were preceded by unsuccessful towns which were built with but little regard for physiographic conditions.

Near the site of Glasgow (Fig. 1) the Chariton River enters the Missouri. The Chariton gave access to a fertile back country and its confluence with the Missouri was recognized as an important town site. As early as 1817, the year in which Franklin was founded, the town of Chariton was laid out on the flood plain about two miles above the confluence. While Chariton did not suffer the fate of Franklin of being washed into the river, the site was subject to floods and consequent malaria. It was abandoned in 1829. Thorntonsburg, nearer the confluence, was laid out in 1832, but was soon abandoned. Finally, the proper geographical response was found, and Glasgow was laid out in 1836 on the bluffs about a mile below the confluence of the rivers. The town prospered and became an important point of river traffic, and a distributing center for the Chariton country. It is still a flourishing little city.

Brunswick (Fig. 8), at the mouth of the Grand River, had a similar history. It was first laid out on the flood plain at the foot of the bluffs. Before any considerable growth had taken place, a new town was founded on the bluffs (1836). At that time the Missouri swung northward and joined the Grand at the foot of the bluff on which Brunswick is built. (Fig. 8.) Like Glasgow, Brunswick had a good site and river frontage. It was the distributing center for the Grand River country, and became an important river town.

(To be concluded.)

PROGRESS OF TROPICAL EAST AFRICA*

German East Africa bids fair to have larger economic development than was anticipated during the first years of the German occupancy. Mr. Müllendorff, editor of the *Cologne Zeitung,* who spent several months in the Colony, has given the results of his observations in this book, with special attention to the present status of colonial activity in the German and English parts of East Africa, to the development of technical methods in all branches of colonial exploitation, and to the possibilities of the country for permanent settlement by Europeans. His impressions are encouraging. The greatest obstacle, he says, is the influence of Mohammedanism. East Africa, in spite of German and English occupation, is practically a Moslem country. The conversion of the natives to Mohammedanism is much easier than the acceptance of Christianity, because only a declaration of faith, and circumcision are required, without the long preparation for baptism which the Christian missionary inflicts upon his disciples; consequently the name of Mohammed is much more popular with the natives than that of Christ. Moreover, the rivalry among missionaries of different denominations undermines the confidence of the natives in their teachings; and the partition of East Africa by two of the Colonial powers often stands in the way of economic progress.

Physiographically, three regions may be distinguished: First, the coast where hemp, rubber, and cotton are grown with increasing success; second, the steppe, which has so far repelled all attempts at cultivation; third, the highlands of the interior whose qualities for cultivation are becoming more and more appreciated as colonization advances. Much is done on both sides of the line to ascertain their possibilities for profitable settlement; but the methods used by the two governments are quite different. The English experimental stations and farms serve distinctly practical purposes; their object is to show the colonists how to conduct a farming or cattle business on a paying basis, while the corresponding German institutions are doing mainly scientific work, taking it for granted that the practical application of such work will be a matter of course when occasion arises.

The Biological and Agricultural Institute at Amani, in the mountains of Eastern Usambara, is the leading German institution of this class. It has about 700 acres of land under cultivation, at elevations of from 1,300 to 3,600 feet above sea-level. The institute is housed in fifteen stone buildings, both dwellings and laboratories. The work is done partly in experimental fields where the qualifications of the different plants for cultivation on certain soils, and at certain heights, are studied, partly in the primeval forests, partly in the laboratory. Unknown trees in the woods, for instance, are marked by fixing numbers to the stems—the figures, at the time of the author's visit, ran up to over 1,800, which means that so many trees were under observation. In due season, blossoms and fruits are sent, with the number of the tree, to the botanical center for identification. Scientific forestry is receiving a powerful impetus in this way. It is a great drawback that, owing to the governmental predilection for rotation in office among its employees, the foresters do not, as a rule, stay long enough to become personally acquainted with the flora of their respective districts. Although the government does not manufacture the lumber, but leases the privilege to a number of lumber companies, it should use its staff to determine the uses of the native woods, and should try to introduce them on the world markets. So far, good results have been obtained with a native cedar, *Juniperus procera*, for furniture, panelling, shipbuilding, as well as for pencils, brushes, and toys. Another tree, known as *Mkweo,* supplies a kind of lumber similar to walnut, and has been used with good effect, for the woodwork of the smoking saloon of a Lloyd steamer.

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*Ost-Afrika im Aufstieg. Von Prosper Müllendorff. v and 253 pp. Maps. G. D. Baedeker, Essen, 1910. Mk. 2.40. 9 x 6½.

Experiments with rubber trees have shown that the species best fitted to the country is *Manihot Glazovii,* because it stands the dryer climate of East Africa better than the standard species, *Hevea Brasiliensis.* The product is not yet equal to genuine *Hevea* rubber because it cannot be produced as pure as the South American kind. Further experiments which the planters have made on their own account seem to prove, however, that it can be purified and a standard quality, fully able to compete with other brands, may be produced. Shaped into bricks and with a stamped guarantee of its quality, the purified product may be put on the market without being classed with the inferior domestic kind.

Sisal hemp promises to become the leading product of German East Africa. Its culture was started with seventy-two sisal plants imported from Yucatan twelve years ago, and as sisal has proved equal to Manila hemp for all kinds of cordage, and is adapted to many other industries as well, its export value had grown to $500,000 in 1907, increasing in Tanga alone, by 150 per cent. that year.

Cotton has not yet passed the experimental stage, but much attention is given to it on account of the large amounts needed by the mother country. The species best adapted to the climate has not yet been determined, but the results are encouraging. The greatest obstacle to finding a market for the quality grades is that cotton is a very popular culture with the natives, and their careless ways of picking and cleaning it have brought discredit not only on their own products, but the prejudice has naturally been extended also to the much better kinds produced by the white planters. Energetic measures by the government and the Planters' Associations will be needed to overcome this disadvantage.

Coffee, in spite of early failures, is now doing splendidly in East Usambara. While formerly it had to be sold under a Brazilian name in order to find buyers at all, it has now made for itself a place on the European market, and is considered a good quality brand by the brokers.

The cooler highlands of tropical East Africa promise also to become great cattle countries. Owing to the fact that the dry season lasts only three months, against six in South Africa, and that there is no winter, only the rainy season, the pastures may be used all the year round. Sheep farming for wool and mutton is profitable and quite popular with the English farmers, while the Germans prefer to raise hogs. With ostrich farms, successful experiments have been made in British East Africa. Vegetables, especially beans, as well as berries and fruit seem to find the country well suited to their needs, and could be raised profitably if there was access to large markets. The lack of roads and railroads is the greatest deficiency of East Africa, and it is even greater on the German than on the English side. With good roads and modern machinery, the country will have a great future.

It is not a country for the poor immigrant and small farmer. People going there must have a handsome sum to invest, but when properly managed the plantations bring good returns, and the number of people, especially among the English, who derive a comfortable income from their East African possessions, is increasing every year. The best proof of the promising character of the country is, perhaps, the considerable number of white people not German or English who have settled there from abroad. In the Kilimandjaro region the Boers are a not unmitigated blessing. Their habit of killing all the game they can reach regardless of governmental regulations, makes them rather unpopular; but as pioneers on hitherto untrodden paths even the Trek-Boers are fulfilling an historic mission, and besides, a great many of them have already come to stay as regular settlers. Aided by their South African experience, they become most successful farmers and cattle raisers. They send their children to the governmental schools and seem perfectly willing to become good German citizens. From Egypt, many Greeks have immigrated; they also make very desirable colonists, economically and politically. Russo-Germans, however, from the Caucasus country were not satisfactory. They had lived so long in a half-civilized environment that they had lost all qualities for good citizenship. They did not want to work, nor send their children to school, and were generally a lawless and violent set, so that most of them were sent back to their old homes.

The management of the natives is becoming easier. The best way to obtain an influence over them is to make the chief see the advantage of European methods and let him influence his people. In the larger places on the coast, the government schools, mostly trade schools, do good work, especially when the instruction is unsectarian. On the Usambara railroad the employment of colored train hands has been tried for the first time, and successfully. This peaceful penetration with sufficient capital, roads, and machinery, is the indispensible prerequisite for the future development of these promising regions.

MARTHA KRUG GENTHE.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

AN EXHIBITION OF PHOTOGRAPHS. The Society opened in its house on Sept. 9, an exhibition of about 700 photographs illustrating scenic aspects and phases of development in the western half of the United States and in the southern States. A series of views of the North Carolina Appalachians is shown to contrast their picturesque and quiet beauty with the grand and rugged aspects of our western scenery. Lands reclaimed by irrigation and dry farming, western towns fostered by mining, lumbering, agricultural and other interests are shown; also many of the activities in our southern States including truck farming, plantation scenes, live-stock and manufactures. A few typical American cities, including Cleveland, Toledo, Detroit, Duluth, Seattle, Portland, Ore., San Francisco, Salt

Lake City, Memphis, Chattanooga, Atlanta, New Orleans and Galveston are represented by panoramas or small photographs. The exhibition is open to members of the Society and the general public between 10 A. M. and 5 P. M.

NORTH AMERICA

THE STORM KING CROSSING OF THE HUDSON RIVER. Prof. J. F. Kemp has written for *"The American Journal of Science"* (July 1912) a paper on the crossing of the Hudson R. at Storm King by the new Catskill Aqueduct. The aqueduct was to cross through the bed rock of the Hudson from Storm King Mountain on the west bank to Breakneck Mountain on the east. It was necessary to find bed-rock. In 1908 the drill, with great difficulty, was sent down in the middle of the river and at a depth of 580 feet the hole was still in sand and boulders. Bed-rock had not yet been reached.

It was hoped in 1909 to drill down to bed-rock before the freezing of the river made further operations impossible. This hope was not realized, for the bottom of the hole at 768 feet was still short of bed-rock when winter closed in. It was thus proven that the bed-rock granite of the Hudson at the Storm King crossing was more than 768 feet below the surface of the river; but it was also ascertained that, 675 feet to the west, bed-rock was only a little over 500 feet below the surface; and 675 feet to the east, bed-rock was encountered at 450 feet below the surface.

The work done since then shows that the bed-rock of the Hudson lies between 768 feet and 955 feet below the surface of the river. It was wholly unexpected that the bed-rock would be at so great a depth. The larger portion of the rock is granite from shore to shore and for a mile or two on each side. It is a part of the large Storm King batholith which is so important a feature of this portion of the Highlands.

In excavating the tunnel through bed-rock only two small faults were encountered in the rock. These faults are the chief source of the small amount of water entering the tunnel. Although the tunnel is 3,022 feet from shaft to shaft and is 18 feet in diameter, the wall-rock is practically dry throughout the larger part of its course.

If water erosion of the bed of the Hudson is not the cause of the great depth at which the bed-rock is found, then the Storm King Pass has been overdeepened by some other agent than water. There is but one other agent and that is ice. "Sub-glacial erosions would therefore follow. Opinion in America in recent years has been predominantly against glacial erosion, but various lines of evidence are making this process more and more probable. The Storm King Crossing would seem to be a favorable place for it."

WATER TRANSPORTATION BETWEEN CHICAGO AND THE MISSISSIPPI. A canal boat carrying a cargo of salt left Chicago on June 1 last, passed through the Chicago River and Drainage Canal to Lockport, thence by the Illinois and Michigan Canal to La Salle, thence by the Illinois River to the Hennepin Canal and thence to the Mississippi, which was reached on June 8, and the cargo quickly and economically unloaded at Muscatine. The trip was made to illustrate the possibilities of a deep water canal between the Great Lakes and the Mississippi and has at least proved the feasibility of a canal boat haul for cargo over this distance. It is now proposed to bring several vessels from the Erie Canal and use them for carrying salt by this route to various points in Iowa.

The Hennepin Canal is in fine condition with plenty of room, good water, and a good lock service. It is recommended that the locks on the old Illinois and Michigan Canal should be enlarged to the size of those on the Hennepin Canal, the depth increased to 8 feet and the sides strengthened. Barges 30 feet wide and 140 feet long carrying 800 tons could then pass between Chicago and the Mississippi and enable an enormous tonnage to be very economically carried.

OUR COAL PRODUCTION IN 1911. The total quantity of coal mined in the United States in 1911 was 496,188,308 short tons; in 1910 the total was 501,596,378 short tons. We are now mining about a half billion tons of coal a year.

Water Powers of North Carolina. The North Carolina Geological and Economical Survey has issued *Bulletin* No. 20, "Water Powers of North Carolina," presenting a large amount of data relating to the flow and power of North Carolina streams. These data consist chiefly of gage heights and discharge measurements which are used to show the continuous daily flow of the streams; also river profiles that can be used to estimate the available fall at any place. North Carolina stands perhaps first in the number and magnitude of her available water powers. Since 1898 the State survey, in cooperation with the U. S. Geological Survey, has maintained gaging stations on the principal rivers and streams at which daily measurements have been made of the height of the river surfaces. Measurements have also been made of the flow and volume of water. These data have made it possible to prepare tables giving the amount of available water that a stream will carry and how much this can be increased by storage and reservoirs. The present volume presents the results of these investigations carried on through a term of years, so that the results given regarding the available water power at all seasons of the year can be relied upon as accurate.

Map of Illinois. A second edition of the "New Base Map of Illinois," on a scale of approximately eight miles to the inch has been prepared by the State Geological Survey. It is in three colors, drainage features in blue, railroads, land lines, towns, etc., in black, and county boundaries and altitudes in red. The map eliminates the errors of early land surveys, so that places are shown with correct latitude and longitude. Railroad alignments are all highly accurate.

The Parker Expedition to Mt. McKinley. The members of the expedition led by Prof. Herschell C. Parker have returned home after having, with great difficulty, ascended Mt. McKinley to an altitude of about 20,000 feet. They were only about 300 feet from the summit when a very hard storm compelled them to give up the attempt. The party charted a large area that had not hitherto been mapped and practically demonstrated the possibility of reaching the top of Mt. McKinley by the northern or Muldrow glacier route.

The Port of Prince Rupert. Prince Rupert, on the Pacific Coast about 550 miles north of Vancouver, is the Pacific terminus of the Grand Trunk Pacific Railway and is destined to become a very important seaport. Its development is rapidly progressing. Its harbor is formed by Kaien Island on the southeast, and Thompson peninsula and Digby Island on the northwest. The entrance is about a half mile wide at its narrowest point and no harbor along the coast can be more easily entered. It is about nine miles long and three-quarters of a mile to a mile and a half wide. The shore is rocky, falling off steeply to a depth of 120 feet. For this reason the wharves on the Prince Rupert side of the harbor have to be built along the shore line without slips.

Port Edward, eight miles from Prince Rupert, is now being developed as an industrial center, and is being connected with Prince Rupert by rail. It has exceptional facilities for the erection of wharves and the dockage capacity, per unit of water-front, will be much greater than Prince Rupert itself can offer.

SOUTH AMERICA.

New Port of Valparaiso. Valparaiso has the most commodious harbor on the western coast of South America but unfortunately it is open to storms from the north which occasionally do much damage to shipping in the harbor. The harbor works which it was expected would fully obviate this difficulty and make the harbor entirely secure were destroyed by the earthquake of 1908. The construction of a new port is now in progress. It will provide a harbor, capable of berthing the largest modern ships and will include: a breakwater, 945 feet long; a quay wall, 2,066 feet long, strengthening and extending the fiscal wharf to a length of 1,214 feet; another quay wall 600 feet long; a jetty, 820 feet long and 328 feet wide; a coal wharf, 656 feet long and 328 feet wide; a coal wharf, 656 feet long and 100 feet wide, including coal transporters, hoists, cranes, railroad, etc. All the necessary customs and other warehouses, administration buildings, lighthouses, and coastguard stations are also to be provided. The new harbor, when completed, will have a depth of forty feet of water. (*Shipping Illustrated.*)

BOLIVIA'S NEW CONNECTION WITH THE PACIFIC. The third railroad between Bolivia and the Pacific is practically completed and traffic will probably be opened in September. This is the railroad between the Port of Arica, Chile, and La Paz, Bolivia. Built across the Andes, some unique engineering problems were involved. The cost of construction was about $14,600,000. The line is 264 miles long. As Arica is one of the best ports on the South Pacific coast, it is expected that the line will compete sharply with the earlier rail routes to Bolivia. It gives the shortest haul between that republic and the Pacific. It has one disadvantage, however: for about twenty-five miles the grade is too steep for an ordinary track and a rack road is employed, which involves some delay and extra expense.

PRIMITIVE MAN IN SOUTH AMERICA. In 1910 the Smithsonian Institution sent Dr. Ales Hrdlička, Curator of Physical Anthropology in the U. S. National Museum, to make a study of available material relating to ancient man in South America. He had already studied the same problem in North America and was much interested in the evidence bearing on the antiquity of man in the southern continent. As geological investigation is important in studies of this character, Mr. Bailey Willis, of the U. S. Geological Survey was detailed to accompany Dr. Hrdlička. The chief purposes were to examine skeletal remains in Brazil and Argentina and the localities and deposits from which these finds came.

The Museum collections in Argentina were studied and also several localities where important specimens had been found. The researches occupied about three months. Every specimen relating to ancient man that could be found was examined and every important locality investigated. The general results of the inquiry are not in harmony with claims previously made by various students who reported the finds. The conclusion was reached that, to the present time, the evidence is unfavorable to the hypothesis of man's great antiquity in that region, especially as to the existence of very early predecessors of the Indian in South America; nor does it sustain the theories of the evolution of man in general or even that of an American race alone in the southern continent. The facts collected merely attest the presence of the already differentiated and relatively modern American Indian. Early man may have existed in South America, but this proposition is not yet established.

AFRICA

THE RIFT VALLEY IN CENTRAL AFRICA. Prof. George L. Collie, of Beloit College, Wis., has a paper on the "Plateau of British East Africa"* in the *Bull. Geol. Soc. of Amer.* (Vol. 23, 1912, No. 2, pp. 297-316), in which he describes the geology and physiography of the Plateau and devotes several pages to a discussion of the Great Rift Valley which extends, according to the supposition of Suess, from Lake Nyasa in about 15° S. northeasterly to the neighborhood of Antioch, Syria, 35° N. Lat. a distance of nearly 3,500 miles. After a discussion of the Valley in British East Africa, as to its position, origin, escarpments, valley-floor, lakes, drainage, etc., he ventures to predict the fate of the Rift Valley in the future.

"Since the Rift is a valley of accumulation," he says, "it might become filled with detritus in the course of time, but it would take long to obliterate it by this method. Erosion, however, is removing the divide which separates it from the Victoria basin, and that with rapidity. When this divide is taken away, the warm, moisture-laden winds from the Congo region, which now precipitate their contents on the western slope of the divide, will sweep across the Rift Valley and yield their rainfall to the eastern escarpment. Streams will then flow across the present Rift to the Nile basin, and the Rift Valley will be added to that great system of drainage. The east wall will then be attacked and retreat until a suitable gradient has been established to the Nile. By that time the Rift will largely disappear, perhaps leaving no trace of its existence. All that may be left to tell the story of its greatness and uniqueness will be the records of those who saw it in its pristine days."

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* Prof. Collie's paper "The Plateau of British East Africa and Its Inhabitants" appeared in the *Bull. Amer. Geog. Soc.*, Vol. 44, 1912, No. 5, pp. 321-334.

GROWTH IN POPULATION OF THE ANGLO-EGYPTIAN SUDAN. In Lord Kitchener's *First Report* on the Anglo-Egyptian Sudan, he presents figures for population that strikingly illustrate the progress of this vast territory under British administration. Before the Mahdists conquered this southern territory of Egypt, the population numbered about 9,000,000. It sank to 2,000,000 as the result of the Mahdist *régime*. The population is now 3,000,000 again and Lord Kitchener predicts that in all probability it will double that figure in five years. (*The London Times Weekly edition No. 1,849, 1912.*)

PORT SUDAN. A few years ago there was not even a native village where Port Sudan now stands on the Red Sea. The value of the imports received at Port Sudan in 1911 was about $6,500,000, more than double the value of the imports in 1909. The value of the exports in 1911 was about $1,290,000 and exports continue to increase at a remarkable rate. One of the chief causes of this development is the extension of the railroad to the south of Khartum which has brought the fertile Gezireh district between the White and Blue Niles into direct and easy communication with the sea by way of the railroad that extends from the Nile to Port Sudan. In the near future the trade of the Anglo-Egyptian Sudan will be a very important feature of African commerce. (Condensed from *Board of Trade Journal,* Vol. 78, 1912, No. 822, p. 524.)

ITALIAN SOMALILAND. Some additional light on the imperfectly known geography of this regions is given by Professor Baldacci of the University of Bologna in a recent number of the *Revue Économique Internationale* (Vol. III, No. 3, 15-20 Sept., 1911). Italian Somaliland covers a total area of about 150,000 square miles. Its 300,000 inhabitants are largely nomads in whom the spirit of independence is strong and whose nature is warlike. The natural region of which the Italian colony forms part has a fairly well defined trapezoidal shape. It is washed on two sides by the waters of the Indian Ocean and extends inland to Lake Rodolf and the Ukamba district. This physiographic unit stands out conspicuously as a sloping plain devoid of noteworthy orographic features. Starting from its lowest point along the mouth of the Juba R. it rises gradually in all directions to a height that does not exceed 1,000 meters except on its northern boundary. The whole region is somewhat arid. In the north the small watercourses bear close resemblance to the wadis of the Sahara desert. In the south, streams vanish in the sands before reaching the coasts. The Juba alone discharges its waters into the ocean although not before having lost a large percentage by evaporation.

The most important economic district of the Italian colony is near its southern border. It comprises the valleys of the Juba and Shebeli. Agriculture, forestry and cattle-raising appear destined to thrive within its borders. Kismayu its natural harbor, however, lies just beyond the boundary on British territory. At present banana, corn, sesame, tobacco and cotton are raised by the natives, who manage often to obtain three to four crops yearly despite their primitive methods of work.

EMIN PASHA'S UNPUBLISHED SCIENTIFIC MEMOIRS. The scientific data of this famous explorer are collected in sixteen manuscript volumes and accompanied by many loose sheets on which Emin Pasha had recorded his routes in the Congo after his separation from Dr. Stuhlmann. Only eight of these volumes are actual notes of travel. The others contain zoological and meterological data. They comprise the period between 1874 and the date of his murder by natives on Oct. 23, 1892. Emin Pasha was much involved in the political affairs of the natives and his notes on this phase of their development are as interesting as his scientific data. The story of the vicissitudes that befell these documents is given in the *Boll. Soc. Geogr. Ital.* (July, 1912).

After the explorer's murder all his notes were preserved by the Belgian authorities and in time were given to one of his daughters in Berlin. They were sold by her to a wealthy man of that city who eventually emigrated to America. All trace was lost of them at last and it was not till two years ago that Dr. Stuhlmann learned that they were in America and had been offered for sale. Subsequently they appeared for sale in the hands of G. Schultzer, of Berlin, a nephew of Emin Pasha. After their authenticity and scientific value had been ascertained, Dr. Stuhlmann persuaded the managers of the Colonial Institute of Hamburg to buy the whole set.

AUSTRALASIA AND OCEANIA

THE CENSUS OF THE UNITED STATES SAMOAN ISLANDS. By direction of the Governor-General, Captain William M. Crose, U. S. N., the census of American Samoa was taken on February 1, 1912. The figures have been published in the government newspaper, *Le Fa'atonu,* for May and are summed up in the following table:

	SAMOANS	OTHER POLYNESIANS	HALF CASTES	CAUCASIANS	TOTAL
Tutuila East	2,750	74	200	162	3,186
Tutuila West	2,133	44	76	15	2,268
Manu'a	1,776	3	16	2	1,797
Total	6,659	121	292	179	7,251

In 1892 Dr. Reinecke gave the round number of 4000 as the population of Tutuila and Manu'a, certainly without inclusion of Caucasians and probably meaning Samoans only. This figure derives from the seldom trustworthy returns of the Samoan pastors to the London Missionary Society; while fairly accurate as regards their own parishioners their reports always tend to minimize the numbers of those affiliated with the older communion.

This official census subdivides the total population into males 3836, females 3415. From these totals should be withdrawn the official population of the naval establishment, 193 men, 16 women. Thence is derived the record of indigenous population as 3643 males and 3399 females, which corresponds in reasonable accuracy with Reinecke's showing for Upolu and Savaii of 16,850 males and 15,950 females. These records show quite plainly that the Samoans are not a dying race. They are now far below the limit of agricultural toleration of their land and it is expected that with the amelioration of their condition under enlightened administration and with the cessation of the wars which have desolated the islands for at least two generations, a marked improvement in the statistical position will become manifest. W. C.

POLAR

GREENLAND AGAIN CROSSED. It was reported in the *Evening Journal* of New York on September 13, that Dr. M. A. Quervain, a young Swiss meteorologist who had had some experience on the inland ice of Greenland, has crossed the inland ice from West Greenland to the east coast and that his scientific results are important.

His programme as outlined in *Le Globe,* No. 1, 1912 (Geneva Geographical Society), was to cross from Holstenborg, in West Greenland to Angmagsalik on the east coast by a route considerably to the north of Nansen's. He expected to have three comrades, four sledges and twenty-five dogs and to set out on the journey about May 25. He hoped to reach Angmagsalik about Aug. 1 and return by steamer to Europe early in the fall.

MR. LEFFINGWELL'S PLANS. A letter from Ernest DeK. Leffingwell written at Flaxman Island, Alaska, dated May 20th, informs his family of his decision to spend the winter in California and the East, returning in 1913 for another summer's work on the north coast of Alaska. The letter was not received until August.

MIKKELSEN'S RETURN FROM EAST GREENLAND. Captain Ejnar Mikkelsen and his companion, Engineer Iversen, have safely been returned to Denmark by the Norwegian fishing vessel Söblomsten which found them on the coast of East Greenland. They had been given up as lost. For more than a year they had lived chiefly upon the game they were able to kill. Mikkelsen reports that he found various records and the diary of Mylius Erichsen who, with his two companions Brönlund and Hagen, perished after completing the mapping of the unknown coast of northeast Greenland. This map was recovered and a description of it was printed in the *Bulletin* (Vol. 41, 1909, pp. 23-25), following an account of what was known of Mylius-Erichsen's great sledge journey (Vol. 40, 1908, pp. 553-4). Mikkelsen found on the coast of Denmark Fiord two cairns containing Erichsen's reports of discoveries, from which it would appear that Peary Channel does not extend from Robeson Channel to the Greenland Sea as has been represented on the maps. Mikkelsen and Iversen spent the past two winters, amid great privations, partly on Shannon Island and partly on Bass Rock Island.

POLITICAL STATUS OF SPITZBERGEN. The *Geographical Journal* (Vol. 39, 1912, No. 6, p. 617), announces that the conference on this subject between representatives of Russia, Sweden and Norway lately met at Christiania and agreed upon a convention according to which Spitzbergen will be a neutral territory open to all nations but administered by a joint board consisting of one representative of each of the contracting powers. Taxes are to be levied by the board but only with the approval of the respective governments.

CYCLONIC MOVEMENTS IN THE ARCTIC. A much-belated discussion of the movements of cyclones in the Arctic in the period September, 1882, to August, 1883, by Edouard Vincent, has appeared in the *Mémoires* of the *Academie royale de Belgique, Classe des Sciences* (II ser., tome III, 1910). The material used comprised the international polar observations of 1882 and 1883, together with those made at certain other permanent stations somewhat farther south. Using these data, the author has been able to construct synoptic daily pressure maps for the area within lat. 60° N. The interest in the history of our extra-tropical cyclones after they leave our own latitudes on their poleward journey naturally makes such a study as that of Vincent one of considerable importance. It appears from the charts that cyclones seldom travel beyond latitude 80° N. In two cases only within the period in question did they pass north of latitude 85°. Further, with increasing latitude the cyclones last a shorter time; they may be followed for three or four days, but hardly ever for seven or eight days, as is the case so frequently in lower latitudes. The pressure at the center of polar cyclones is never very low. The polar area is clearly not one of marked atmospheric disturbances. It has, as a matter of fact, been pretty clear for some years that the inner polar area, in both hemispheres, is beyond the region of the marked cyclonic disturbances of our own latitudes. The most recent expeditions in the Antarctic have confirmed this view. R. DEC. W.

THE JAPANESE ANTARCTIC EXPEDITION. The *Kainan Maru* under the command of Lieut. Shirase arrived at Yokohama on June 19 last. A preliminary report of its work in the Antarctic published in *Ostasiatischer Lloyd* 1912, No. 16 and 18, is reproduced in *Petermanns Mitteilungen,* Vol. 58, 1912, July, p. 34. It appears from this account that the stay of the party on the Antarctic continent was limited to four weeks. They landed in Whale Bay, Amundsen's winter quarters, on Jan. 16, this year, and four days later Shirase led a party into the interior which returned to Whale Bay on Feb. 1 after an absence of eleven days. Meanwhile Capt. Nomura took the *Kainan Maru* to the east as far as Biscoe Bay where he climbed Alexandra Peak. His farthest eastward position was in 150° W., 73° S. Meanwhile a sledge party under Takeda traveled to the southeast as far as 156°27′ W., 80°5′ S., where an altitude of 1,300 ft. was reached. On Feb. 14, the Japanese vessel started on the homeward journey as the party had neither coal nor provisions for a longer stay. Lieut. Shirase is said to claim that he has proved that there is no connection between South Victoria Land and King Edward VII Land. As the work of Amundsen, Scott and Shackleton seems to have convinced those explorers of the strong probability that these lands are connected, Lieut. Shirase's opinion, may be regarded as speculative.

PERSONAL

Dr. Henryk Arctowski. The University of Lemberg, Austria, on the occasion of its 250th anniversary, conferred upon Henryk Arctowski, Chief of the Science Division, of the New York Public Library, the honorary degree of Doctor of Philosophy. Dr. Arctowski has an international reputation as a meteorologist and his attainments were especially brought to notice by his work as the meteorologist of the Belgian Antarctic Expedition. More recently he has been engaged in researches looking towards the prediction for some years in advance of weather and its effects on crops and food supply. His initial papers on this subject have appeared in the *Bulletin* of this Society and others are also in course of publication in the *Bulletin*.

Prof. Rollin D. Salisbury. Prof. Salisbury head of the Department of Geography and Dean of the Ogden Graduate School of Science in the University of Chicago sailed recently for South America with Mr. Bailey Willis, C. E. of the U. S. Geological Survey. It was their purpose to cross the Isthmus of Panama, go down the west coast to Valparaiso, spend a few days on the west side of the Andes and then take the Trans-Andean R.R. for northern Argentina and Buenos Aires. About Oct. 1, Prof. Salisbury expects to camp in Patagonia at Lake Nahuel Huapi in the eastern Andes and later to inspect the iron deposits of Brazil.

OBITUARY

Prof. José Arechavaleta. Prof. Arechavaleta, Director of the Museo de Historia Natural, Montevideo, Uruguay, died in that city on June 16 last at the age of 63 years. He was born at Bilbao, Spain.

Dr. W J McGee. Dr. McGee, whose contributions to geology, anthropology and the conservation of natural resources made him widely known, died on Sept. 5, aged 59 years. In 1887–91 he made a geological and physiographical survey of northeastern Iowa, the most extensive ever carried out in America without public aid. His "Pleistocene History of Northeastern Iowa" was published in 1891. Later he became attached to the U. S. Geological Survey, had charge of the surveying and mapping of 300,000 square miles in the southeastern part of the country, investigated the Charleston earthquake in 1886, served as ethnologist in charge of the Bureau of American Ethnology in 1893-1903 and held other important positions. He was distinguished as a lecturer and a writer and many of his scientific memoirs and over 300 minor articles were published by the Government.

GENERAL

The XIIth International Congress of Geology. The International Geological Congress, on the joint invitation of the Government of Canada, the Provincial Governments, the Department of Mines, and the Canadian Mining Institute will hold its twelfth meeting in Canada during the summer of 1913, under the honorary presidency of H. R. H. the Duke of Connaught, Governor General of the Dominion of Canada. The Executive Committee consists of the following gentlemen:

President.—Frank D. Adams, D.Sc., F.R.S., Dean of the Faculty of Applied Science and Logan Professor of Geology, McGill University, Montreal.

General Secretary.—R. W. Brock, M.A., F.R.S.G., Director of the Geological Survey of Canada, Ottawa.

Members.—Alfred E. Barlow, D.Sc., F.R.G.S., McGill University, Montreal; A. P. Coleman, Ph.D., F.R.S., Professor of Geology, University of Toronto; Théo. C. Denis, B.A. Sc., Superintendent of Mines for the Province of Quebec, Quebec; O. E. Leroy, B.A., M.Sc., Geological Survey, Ottawa; G. G. S. Lindsey, B.A., K.C., 27 Manning Arcade, Toronto; William McInnes, B.A., Geological Survey, Ottawa; Willet C. Miller, LL.D., F.R.S.G., Geologist for the province of Ontario, Toronto; W. A. Parks, B.A., Ph.D., Department of Geology, University of Toronto, Toronto; J. B. Tyrrell, M.A., F.R.S.G., 534 Confederation Life Building, Toronto.

Secretary.—W. Stanley Lecky, A. R. S. M., Victoria Memorial Museum, Ottawa.

The following topics have been selected by the Committee as the principal subjects for discussion:

1. The coal resources of the world.
2. Differentiation in igneous magmas.
3. The influence of depth on the character of metalliferous deposits.
4. The origin and extent of the pre-Cambrian sedimentaries.
5. The sub-divisions, correlation and terminology of the pre-Cambrian.
6. To what extent was the Ice Age broken by interglacial periods?
7. The physical and faunal characteristics of the Palaeozoic seas with reference to the value of the recurrence of seas in establishing geologic systems.

It is proposed to hold the meeting of the Congress in Toronto, beginning on or about August 21. The Congress will continue in session for eight days. Arrangements have been made for a series of excursions which will enable the members of the Congress to gain a knowledge of the geology and physiography as well as the mineral and other natural resources of Canada. These excursions will take place before and after the meeting of the Congress. Members will have the opportunity of participating in one or more of the longer, in addition to several of the shorter, excursions.

WIND-BLOWN TREES. Some very remarkable photographs of wind-blown trees are reproduced in a recent article by Dr. Oscar Burchard, director of the German meteorological station at Puerto de Orotava, on the island of Teneriffe (*Met. Zeitschr.*, Vo. XXIX, 1912, p. i). The trees are very old (*Juniperus phoenicea* L.), and are wind-blown to such an extent that they are actually prostrate on the ground. The direction in which they lie is about N. 67° E. Dr. Burchard rightly concludes that this direction is the resultant of the variations of the northeast trade during the long period during which the trees have been growing. Observations of wind-blown trees might very profitably be made by travelers in little-known regions. The prevailing wind direction, or it may be the direction of the strongest winds, which is often permanently recorded in the direction shown by the trees, is a climatic element of great value. R. DEC. W.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

AMERICA

The Climate of Ohio. By J. Warren Smith. *Bull. 235. Ohio Agric. Experiment Station*, Wooster, O., 1912. Pp. 185–209.

This is a short report, consisting of five pages of text, nine tables and fourteen charts. These charts show the mean annual temperatures, dates of killing frosts, average number of days in the crop-growing season, mean annual and seasonal precipitation, mean annual snowfall, and monthly distribution of precipitation. There are also given curves showing the mean annual temperatures for Ohio for each year from 1883 to 1910, and the mean annual precipitation from 1854 to 1910. The *Bulletin* gives, in compact form, the essential climatic characteristics of the State. R. DeC. Ward.

Geology and Ore Deposits of the Butte District, Montana. By Walter Harvey Weed. 262 pp. Maps, ills. *Prof. Paper* 74, *U. S. Geol. Surv.* 1912.

Apart from its technical value, this Professional Paper contains valuable data of geographic interest on the central tract of the mountainous portion of the State of Montana. This area is partly represented on the geological map shown on Plate I.

A résumé of the physiography of the Butte district precedes its detailed geological review. The formation of the veins is ascribed to the hydrothermal alteration of the rock by metasomatic replacement which also contributed to the mineralization of the wall-rock to a slight degree. As to the source of the copper and the other metals of the quartz-pyrite veins, it is believed, although the evidence is not conclusive, that they are derived from emanations originating in a deep-seated magma. Mineralization is also shown to have been influenced by the process of secondary enrichment.

The author arrives at the conclusion that the output of the district will remain constant for some years to come and will then gradually decline. It is, of course, possible that improved methods of treatment will make pay ore of what is now called waste. The zinc ores also promise to be of great value and to add both to the material wealth and the productive period of the district. The question of ore reserves draws attention to the ephemeral life of all mining communities depending on the yield of their subsoil for their existence as geographic entities.

The main criticism of this work is to be directed against the publishers. We refer to the delay involved in the publication of Mr. Weed's results. The litigation which was in progress at the site of the mines described, ought under no circumstance to have been the cause of the temporary shelving of data of scientific and economic value. Leon Dominian.

Alberta. An Account of Its Wealth and Progress. By Leo Thwaite. Porter's Progress of Nations. 250 pp. Maps, ills. George Routledge & Sons, Ltd., London, 1912. 50 cents. 8 x 5.

This Canadian Province, which has been receiving so much attention as a new agricultural land and an outlet for our own population is here attractively described. The author sketches briefly the history, constitution, and government of the province; more fully, its physical characteristics, topography, resources, soils and water-ways; its rapid development in population, industries, and communications; its cities and towns, education, finance and trade; and finally gives us a glimpse of its possible future as forecasted in its past and present.

Along its western border Alberta has the Rocky Mountains, but over 80 per cent. of its surface is undulating prairie and high plains. The plains, in a very youthful stage of dissection, are crossed from the mountains eastward by tributaries of the Peace, Athabasca and Saskatchewan rivers lying in deep valleys and uniting in these large rivers in mid-country. Between the valleys lie the plateau strips, usually with deep, rich, black soils superior to the black earth of Russia, and with a rather meager supply of water, though most of the precipitation occurs in the growing season. The stratigraphy with its coal, gas, oil, gypsum, salt and clays is much like that of the Dakotas. Irrigation is possible only near the mountains. Water-power is abundant down the valleys. Alberta is believed to have enormous horse-power. Lakes are numerous, and twenty-five are of large size. Fishing in both lakes and streams is excellent. One is surprised at the development already attained. G. D. HUBBARD.

The Selkirk Mountains. A Guide for Mountain Pilgrims and Climbers. By A. O. Wheeler and Elizabeth Parker. x and 199 pp. Maps, ills., appendix, index. Stovel Co., Winnipeg, Canada, 1912. $1.50. 5 x 7½.

This handy little volume presents in compact and readable form a large amount of information which the casual tourist as well as the more ambitious traveler will be glad to have. Opening with a sketch of the early exploration and mountaineering which are brought down to 1911 by an outline of subsequent work, the text next takes up various districts in detail and concludes with brief descriptions of the geology, flora and fauna and related matters. There are also sections on the Alpine Club of Canada and on rules, equipment, etc., for mountaineers.

The two principal chapters are devoted to the summit range contiguous to Glacier and to the Purcell Range and the country about the headwaters of the Columbia River. The latter, being new, is of especial value. In the former, the various orographical features are described alphabetically, full data as to times, distance, altitude, origin of name, location and routes of approach being set forth under each. Inasmuch as this section will be put into practical use by many of its readers, it is disappointing to discover a goodly number of minor slips and contradictions. Space forbids citation of these, but some of the more glaring errors of fact follow: Professor Parker did not climb Grand Mt. (p. 67); Purity Pass (p. 85) is not connected with Purity Glacier, nor is its altitude 9,200 feet, but 8,700 feet; Terminal Peak (p. 98) agrees in neither position nor altitude with the same as mapped; Mt. Sugarloaf cannot be climbed as described under Route 2 (p. 96); Mt. Sir Sandford was first attempted in 1907, not in 1908 (pp. 30 and 94) and not by the party mentioned; Ross Peak Station (p. 90) is too high by over 800 feet, and Beaver Creek Station (p. 49) does not exist.

Passing elsewhere, the following observations are suggested: The Columbia River flows northerly from Columbia Lake for about 175 miles, not 300 miles (p. 10). The author will find few supporters for the statement (p. 150) that heat and cold, contraction and expansion, cause large crevasses in glaciers. Porcupines, squirrels and eagles are common, pages 174 and 176 to the contrary notwithstanding.

Fifty-nine illustrations and six maps are presented. Of the former, Eagle Peak is mislabelled Mt. Avalanche (p. 34), and Mt. Purity is seen from the Bishop's Range (p. 84), not from Donkin Pass. The Cougar Brook view (p. 114) should be inverted. H. PALMER.

South American Problems. By Robert E. Speer. xi and 270 pp. Map, ills., index. Student Volunteer Movement for Foreign Missions, New York, 1912. 7½ x 5.

A singularly sober and well-considered book. Mr. Speer keeps himself in the background, but he seems to have visited every country except perhaps Venezuela, Ecuador and Paraguay and his judgments carry evidence of constant, careful examination of the facts. After quoting Barrett, for instance, for boom statistics of the magnificent areas of the Latin Republics, he adds (p. 35) "It is customary to speak with unlimited wonder of the wealth and resources of South America. It is not to be doubted that the continent has immense riches of agricultural product and mineral treasures waiting to be developed, but the general impression produced upon the observant visitor is disappointing. There are deserts more barren than the worst of ours. The tropical forests and vegetation are coarse and oppressive. The rain and warmth produce luxuriant growths, but tender things, green grass and little flowers die in the shadows or are scorched in the heat. The table land of the Andes above the timber line and with too high an altitude for corn and wheat, the rainless stretches of arid soil, the sandy wastes even in the tropics, the swamps and miasmic forests, must all be measured when we talk of the agricultural possibilities of South America."

Mr. Speer perceives the vast wealth of the Argentine Republic. That country "is in a class by itself" (p. 36). He puts Brazil and Chile next in energy and progressiveness and places at the bottom "of the South American countries that we saw" Peru, Colombia and Bolivia (p. 55). The present writer does not know any brief sketch of the South Americans so sound and illuminating as this. It makes no pretence to be scientific geography. His object was to estimate the call that exists for Protestant Missions in these regions and his book must efface any doubt on the subject. His treatment of the Catholic church of the Latin continent is admirable for its reserve as well as its soundness. He quotes from Hale that in the southern continent "male chastity is unknown" and he might have added "Nor believed to exist anywhere." Immorality is a cancer on southern culture. It is a taint on their physical as well as their spiritual nature. MARK JEFFERSON.

Chile. An Account of its Wealth and Progress. By Julio Perez Canto. Porter's Progress of Nations. 251 pp. Maps, index. George Routledge & Sons, Ltd., London, 1912. 1s. 8 x 5.

About one-third of the volume is given over to an introduction by Robert P. Porter, the object of which is to present a brief account of the early history of Chile leading up to the "modern industrial Chile to which Mr. Perez Canto has been obliged to devote most of his space." Because of the fact that the book is written to supply "immigrants and investors with trustworthy information," it seems that the introduction could have been omitted. The second part handles the necessary information admirably, leaving one with the impression that Chile is a land of golden opportunity. The arguments are not always fully consistent, as shown by the statement in Chapter 11 to the effect that the "backbone of the nation is the agriculturist" and by the climax statement in the closing chapter, "the future of Chile does not rest merely upon the material advantages... ; it is securely based upon the intense patriotism of the inhabitants."

The significance of the Panama Canal as a factor in the future of Chile is evidently left for Mr. Canto to emphasize. After stating how geographical location has handicapped large immigration from Europe especially, he says "the Transandine Railway to Buenos Aires has already commenced to exercise a favorable influence, while the Panama Canal will soon do the same on a vaster scale."

The reader is left with the impression that Chile lacks little in modernism; that its resources are still in large part undeveloped; that its products, both mineral and agricultural, occur in large variety, and that the possibilities of the area for the pursuit of manufacturing industries is fairly unlimited. Potential water power from the swift mountain streams, thick seams of coal deposits, and iron deposits which are "fabulous" promise a brilliant future.

The statistics which are well woven into the chapters on "Navigation," "Trade and Commerce" and "Mining and Metallurgy" are of considerable interest. Authorities, always desirable in connection with data, are not always cited.

A political map of Chile on a scale of approximately 145 miles to the inch folds into the book as an insert and upon the back cover appears a political map of South America on a scale of approximately 753 miles to the inch.

EUGENE VAN CLEEF.

AFRICA

History and Ethnography of Africa South of the Zambesi. From the Settlement of the Portuguese at Sofala in September, 1505, to the Conquest of the Cape Colony by the British in September, 1795. By George McCall Theal. Vol. I, from 1505 to 1700, xxii and 501 pp. Vol. II, Foundation of the Cape Colony by the Dutch, xix and 523 pp. Vol. III, The Cape Colony to 1795, the Koranas, Bantu, and Portuguese in South Africa to 1800, xiii and 499 pp. Index. Maps, ills. in each. Swan, Sonnenschein & Co., Ltd., London, 1909–10. 8½ x 5½.

This is by far the most satisfying, as it is the most pretentious, work upon the colonization history of the land which Vasco da Gama established as the last and overcome obstacle in the path of the fleets to the Indies, the age-long goal of all commerce, the stimulus to all geography. Portugal, the United Provinces, last of all Great Britain, each has had its share in establishing a new world in the south. These three volumes present the record of that activity during the 290 years from the discovery down to the acquisition of the Cape Colony by the British in 1795. In the preparation of this great task Dr. Theal has had the advantages of his long career as keeper of the archives of the colony and as the officially appointed writer of its history.

We are too little inclined to give attention to the marvelous growth of the British Empire, that group of English republics all around the world bound together by the idea of loyalty to the throne, the Dominion of Canada, the Commonwealth of Australia, newest of all the Union of South Africa. Here we have a true republic, self-administrative because wholly self-supporting, which has assumed the burden of development of the whole temperate region of the African continent, an interesting contrast with the Latin communities which face it across the Atlantic in South America. Surely this is a land worthy of the historian. But not yet. The Parkman of South Africa has yet to come, the historian who shall tell the tale of the white man and the black, with abhorrence of savage blood-thirst and with equal scorn of the white invader living in pioneer violence and shabby double-dealing. And Dr. Theal is not so much historian as historiographer.

Yet these volumes are not without interest. We do not know where to turn with the hope of finding even a half of the information here set forth, much of it now for the first time made public. We should be puzzled to discover an equal record of the documentary history of the successive shifts of empire at the Cape and in the lands thereto adjacent. For the narrative of the life of the black whom the first settlers found there and whom they harried and by whom they were scourged until the quite modern days when white might proved itself, as always, white right, for the record of the Bushman, the Hottentot and the free Bantu tribes we know not where else to turn for such rich reward. Should this comment seem to deny this work a position in the first flight of written history it might prove difficult to cite chapter and verse for the impression which the reading of these volumes has produced. Perhaps the opinion may be found to rest upon the possession of what, in default of a particular designation in the terminology of criticism, we may denominate the complacency of the historian. It shows itself in the feeling that the white settler could do more for the land than the black autochthon, that as between the Portuguese discoverer and the Dutch intruder the possession of blood allied to the Anglo-Saxon vital juice made in general for righteousness, that the coming of the British was the satisfaction of the law. Yet we are to recall that the composition of fierce struggles is now less than a dozen years old, the policies of the time of disturbance have not yet passed from mind. WILLIAM CHURCHILL.

Sahara Soudanais. Tome II. Par R. Chudeau. Missions au Sahara. Par E. F. Gautier et R. Chudeau. iv and 326 pp. Maps, ills., index. Armand Colin, Paris, 1909. 15 frs. 10 x 6½.

The second volume of this great work, which has been recognized by a prize from the French Academy of Science, deals with the central and southern

Sahara, Gautier having described in the first volume the Algerian or northern Sahara. The two volumes at present form the best and most reliable treatise on the great African desert, which seemed heretofore to many a region of absolute barrenness and desolation. According to Chudeau, the central and southern Sahara represent a peneplain of Silurian age, being for the greater part uninhabitable, sterile and desolate. The high region of the desert, especially to the southwest of the oasis Titikelt is called Tanezruft, a name given to the desert by the Tuaregs. The Tanezruft is characterized by great irregularity of rainfall, which may be entirely absent for many years, thus offering few or no watering-places for caravan trade. Chudeau gives a vivid description of the different districts and principal places of the central and southern Sahara, such as Aïr, Adrar and Ahaggar, as also of the various Tuareg tribes inhabiting them, the fauna and flora, and the hydrographic and meteorologic conditions. The southern limit of the desert flora corresponds with the northern limit of the regular tropical rains, while in the desert proper only occasionally heavy showers occur, which are more harmful than useful. Cultivated gardens, which are near to the salt-bearing strata, are completely destroyed for years by the salt that overflows them with the rain. Hailstorms occur occasionally. Chudeau mentions also the "dry mists" of the southern desert, which may become so dense that even a camel cannot be seen ten feet away and which cause impenetrable darkness at night. These dry mists of dust indicate to the inhabitants of the desert that in the Sudan the rainy season has set in, because the storm winds which bring the rain in the Sudan are whirling, in the southern part of the desert at least, dust and fine sand. In the "zone sahélienne," the southern boundary of the desert, the desert flora dies out; here also salt plants are absent, so that the camels must have rations of salt instead of finding it. The wind erosion is, according to Chudeau, not progressive in a southerly direction and there is evidence that the desert even retreats from the Sudan northward.

In regard to the commerce of the Sahara and the project of building a transsaharan railroad Chudeau strongly opposes such an undertaking. The transsaharan commerce, he says, is too unimportant to warrant the buliding of a railroad. The small commerce of the interior tribes in salt and garden products, which supply the needs of the natives, would incur a heavy decline in the salt by the building of a railroad, especially at the Senegal and Niger. The railroad would bring foreign salt. Besides, it is a fact that commerce, especially in the western part of the desert, is practically dead. Only the caravanroutes from Zinder and from Lake Chad to the north have little hope of existence for a few more years. The population is slowly decreasing.

CHARLES L. HENNING.

Anthropological Report on the Edo-Speaking Peoples of Nigeria. By Northcote W. Thomas. Part I: Law and Custom; 163 pp., map. Part II: Linguistics; 251 pp. Harrison & Sons, London, 1910. 9 x 5½, each.

This is of the nature of a preliminary report, but when we bear in mind that hitherto nothing has been known of these important people in central Nigeria the sense of the richness here set forth quite obliterates the feeling that this is but a partial statment. Yet Mr. Thomas is very careful to indicate where ceases his precise knowledge and to point out what he considers to be the most promising line of inquiry for further study, whether by himself or by others interested in the life of that community. His work is most complete along the lines of the systems of relationship and vocabulary; in fact, the second volume of the report is wholly given over to texts of Edo narratives and to brief dictionaries of that and other languages associated therewith in the same territory.

WILLIAM CHURCHILL.

La Mission Cottes au Sud-Cameroun (1905 1908). Par le Capitaine A. Cottes. Préface par André Tardieu. xv and 254 pp. Maps, ills. Ernest Leroux, Paris, 1911. 11 x 7½.

It is unfortunate that after the delimiting mission of Captain Cottes had been brilliantly accomplished the results should have been caught within the nexus of the higher diplomacy, that their publication should have been delayed for several years, and that this alert young officer, after displaying a genius for field work in geography, should have been condemned to rust in garrison. The field of his labor was in the southern tier of the Kamerun, the immediately adjacent northern tier of Gabun, and he also presents a summary sketch of the Spanish territory of Guinea, which marches with the two larger territories upon their Atlantic face. The geographical results of this survey are stated with delightful precision. It was really a task of running lines and of setting monuments. Incident thereto the field notes detail with panoramic precision the essential nature of the whole terrain traversed, we thus have from this survey a very full account of the principal line extending irregularly north and south of the second parallel of north latitude from 9° East almost to 14° East, where this line terminates on the bank of the River Sangha; to which is added a similar reconnaissance of the three landward boundaries of Spanish Guinea, the whole supplemented by several considerable excursions through hitherto unexplored territory. The accompanying papers go quite extensively into the anthropology of the region, less enthusiastically into the ethnography and linguistics, and touch lightly but accurately upon the collections in natural history.

WILLIAM CHURCHILL.

ASIA

From Constantinople to the Home of Omar Khayyam. Travels in Transcaucasia and Northern Persia for Historic and Literary Research. By A. V. Williams Jackson, xxxiii and 316 pp. Map, ills., index. Macmillan Co., New York, 1911. $3.50. 9 x 6½.

To have produced page after page of accurate notes of travel, accompanied by historical sketches and enlivened by comment born of cultured thought, is the task of which the author has acquitted himself with credit. The reader's interest is awakened from the first by the transition from Occidental to Oriental life plainly discernible in the Turkish capital. Professor Jackson's sojourn on the shores of the Bosphorus must have been brief, however. Else why should he have need to quote Pliny either on the possibility of persons conversing with each other from bank to bank, or on dogs being heard barking or birds singing across the straits.

The first part of the journey was made through that portion of Russian territory which is peopled mostly by Mohammedans. The numerous architectural monuments inspired by the genius of this creed are described with much minuteness. In Baku the blending of the old and new is laid before the reader's eyes in the shifting scenes evoked by modern industry thriving on the site of vanished splendor. The technical reader might possibly be disappointed with the account of the activity prevailing at the world-renowned oil-fields. The general reader, however, will derive all the information of use to him. On the whole, it is the scholar who will be especially interested by the contrasts between the spirit of modernism revealed by the forest of derricks raised near the now abandoned shrines of the ancient fire-worshippers, whose Hindu origin is sustained by the author in lieu of its more generally ascribed Persian genesis. Beyond and towards the north, historic Derbent is pictured as it now stands, shorn of its former strategic importance.

Over the Caspian Sea and as the reader is led into northern Persia, the narrative teems with facts proving the restless activity displayed by the Russians in their steady endeavor to gain access to an ice-free harbor by absorbing the land of the Persian. The author's route coincided with or skirted Alexander the Great's tracks. The changes occurring along these ancient highways from the time they were overrun by Persian cohorts to the modern days of Persian supremacy, and then again to the period of present decadence, flit through the mind in kaleidoscopic sweeps of vision that add much zest to further research.

A note of sadness enters into the account of the pilgrimage to Omar Khayyam's grave. Devotees of the poet-philosopher will learn with regret what little remembrance of his versatile genius now lives in the minds of the descendants of his townsmen.

The spelling of Oriental names and words will probably be found incorrect by those whose vernacular is either Persian, Arabic or Turkish. If the author's intention has been to retain the native pronunciation, we fail to see why the forms "Muhammad, amrud, shahr, beg, Nasir ad-Din," and so on, in endless succession, should have been used instead of the indigenous versions of "Mohammed, armud, shehir, bey, Nassreddin." They smack of sixteenth and seventeenth century travelers' indifference to accuracy which has been dispelled by modern Oriental studies. While no such negligence can be imputed in the present case, on account of the consistency in the forms adopted, the departure from the original pronunciation leads one to wonder at its cause.

A glimpse of Persia at play with its liberal form of government is also obtained by the perusal of the text. It may be said that a large share of the book's value lies in the description of this country as the author saw it in its present state. Much of the historical information crowded in the text exists in the works of earlier travelers. Our thanks are due to Professor Jackson for correcting in many instances the errors of his predecessors as well as for the new material picked up along the less-known sections of his route. The large number of photographs contribute materially to increase our knowledge of the regions he has visited. LEON DOMINIAN.

Landes- und Volkskunde Palästinas. Von Dr. Gustav Hölscher. Sammlung Göschen. 168 pp. Map, ills., index. G. J. Göschen, Leipzig, 1907. 80 pfg. 6 x 4.

This little hand-book remains one of the most reliable and useful descriptions of the Palestine of to-day. Especially useful is its analysis of the topography of this historic land and its description of the present inhabitants. Unfortunately, it lacks a suitable map equipment. The one map* provided is so congested with names that it is almost useless. Travelers in Palestine will find the information compacted in this little volume of great service. It is a worthy companion of the other volumes in the same series.

CHARLES F. KENT.

Die indischen Grosstädte. Von Dr. Karl Goës. Statist. und Nationalökonomische Abhandl., Heft 7. 93 pp. Tabellen. Ernst Reinhardt, München, 1910. Mk. 5. 10½ x 7½.

Pamphlet in form and ancillary to the census returns of the British Government in India, the care with which these statistics have been compiled for comparison enables the author to point out clearly an interesting detail of the method of imperial government in the peninsula of India. There is nothing in the history of British India from the days of the Honorable East India Company to the present administration to suggest that the British have been guided by a theory of government, that they have ever been other than haphazard in their methods. But in capable hands these figures are made to show that a power which not even slipshod administration could override has been leading Great Britain surely in the direction of the economic conquest of India, a matter far other than the mere political conquest which has cost such treasure of blood and gold. In these tables the author shows how the industrial and social conquest is working itself out in the great cities of Calcutta, Bombay, Madras and others of less note. WILLIAM CHURCHILL.

La Grande Artère de la Chine. Le Yangtseu. Par Joseph Dautremer. 304 pp. Ills., map, index. E. Guilmoto, Paris, 1911. Fr. 6. 9 x 5½.

This book is not a study in potamology but a "Länderkunde" of the provinces of China which are watered by the Yangtse River and its tributaries. The first chapter describes the river itself; it is followed by several chapters on China as a whole, describing the origin and character of the Chinese, their dwellings, food, domestic habits and customs, religion and superstitions, games and pastimes, and social classifications; also the commerce and products of China in general, its administration, currency system, weights and measures.

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* Listed under "Turkey in Asia" (second entry) in *Bull.*, Vol. 44, No. 4, April, 1912, p. 319.

The special chapters deal, each, with an individual province as a unit whose natural conditions, economic status and possibilities are studied from geographical and economical or political points of view. The great colonial problems are placed in the foreground, and special attention is paid to the question why France does not in the Far East occupy a position which would correspond to its importance in Europe as one of the competing powers. One of the principal causes of this discrepancy, according to the author, is a certain lack of enterprise and persistency in the French character. The French are valiant conquerors, but they lack the qualities which make successful colonists. In Shanghai, for instance, the American and English quarters are hustling markets, abodes of live, business men; the French one is a quiet and dignified administrative center, the home of a number of functionaries. Moreover, the petty avarice of the average middle-class Frenchman, while it makes thousands of small capitalists in France, proves fatal abroad, where broadmindedness, initiative, and enterprise alone can make a man or a nation successful. It is owing to this parsimony that French firms, as a rule, do not maintain agencies abroad, nor advertise properly, nor offer free samples, nor encourage their clerks to learn the language of their customers, as the competing nations do. The result is that French imports into China have decreased considerably in proportion as those of Germany, America, and Japan have increased, so that silk ribbons are now the only article of which France still holds a certain monopoly.

The influence of Japan, especially, is increasing by leaps and bounds, and not along commercial lines only. The Chinese press is largely in the hands of Japanese agents. Most of its literature, even when of European origin, comes from the same source: in the library of a distinguished Chinese scholar, for instance, the author found Montesquieu's "Esprit des Lois," Rousseau's "Contrat Social," and Karl Marx's works, in Japanese editions, published in Japan for the use of the Chinese. Under these circumstances one cannot wonder at the recent political changes, although the author himself did not expect them to take place so soon. He witnessed, however, the first manifestation of a united modern China—the Nankin Exposition of 1910. While it was not much heard of abroad—being indeed not much more than a huge county fair of products of the Yangtse valley—it was nevertheless gotten up in direct imitation of Western models, under Japanese influence, and it marked an epoch in the development of China. It was not only because on this occasion the gorgeously dressed mandarins were seen, for the first time in Chinese history, officiating side by side with the reformers in black frock coats at its solemn opening—similar incongruities could be seen almost everywhere in the exposition—but because this assemblage, in the old Ming capital, of products from every part of the country, and the gathering together of people from every corner of it, meant the first concerted action of modern Chinese thought and feeling, which has since worked such astonishing revolutions. As a study of the most important part of China immediately before the revolution, the book is very interesting geographically and economically. MARTHA KRUG GENTHE.

British-India. 1600-1828. (The English People Overseas, Vol. II). By A. Wyatt Tilby. 286 pp. Constable & Co., Ltd., London, 1911. 4s. 6d. 8 x 5½

This work is the story of the inception of British rule in the great peninsula, the resistance of the metropolis to the imperial idea and the stress of circumstances which made a company of merchants in Leadenhall street masters, always reluctant and always incapable, of the destinies of millions. By adopting the artificial limit of 1828, the year of the last Maratha war, as the end of this study we are left with imperialism still in the struggle, the Honorable East India Company is still in the course of that almost divine system of blundering, for it seems impossible that mere men could make such errors, which led to the Mutiny and out of it to the establishment of acknowledged empire. Histories of British India we have in abundance, but this is in a class by itself. It is invaluable for the study of the growth of the imperial idea, whose problems Great Britain is as yet far from having settled on a scientific base.

This work is of great value as a corrective to that history of India which is written in terms of war and victories. It shows how empire was forced upon a trading nation without thought of glory, how little prepared they were for its responsibilities, how little even at the present day, and in far greater case ourselves, fall short of a reasonable scheme of administration.

William Churchill.

The Irrigation of Mesopotamia. By Sir W. Willcocks. 130 pp. 46 plans and maps in portfolio. E. & F. N. Spon, Ltd., London, 1911. 10½ x 7.

It is likely that the engineers on Sir William Willcocks's staff little realized at the outset of their operations how hampered they were to be in their field work. That they were able to cope successfully with the obstacles met is amply proven by this book, which is primarily an exemplary technical report. Viewed from the irrigation engineer's standpoint, its thoroughness reflects credit on its compilers. Some of the data it contains, such as costs of materials, wages, and transportation rates, will doubtless be of value to others than those who are interested in the vast irrigation scheme considered. The gain accruing to science from the industrial information afforded by its text is by no means slight. Sections of it taken together, form a veritable preliminary contribution to our knowledge of Mesopotamian hydrography.

The report has a cartographic importance of particular interest. The Mesopotamia with which it deals is "the true delta of the rivers Euphrates and Tigris, and comprises the country traversed by the two rivers and their branches southwards of Hitt, on the Euphrates, and Samarra, on the Tigris." No complete map of this region exists so far, no levelling having been undertaken before the advent of Sir William Willcocks's assistants. The work of the party's surveyors, as reflected in their maps therefore provides new material which can be made available for the compilation of a regional map. It is to be regretted that owing to the limited time at the disposal of the engineering parties, no triangulation points could be established. The joint achievement of the four survey parties has resulted in the preparation of sections of the first 1:50,000 map of the delta on which elevations are referred to mean sea level, the determination of which was obtained at Khor Abdallah, south of Basra, on two consecutive days. The traverses (plane table, tacheometer and magnetic needle) run down the Tigris and Euphrates and the center of the country, added to the cross-traverses between the two rivers, will permit plotting of geographic units with a greater degree of accuracy than has been hitherto attained.

A mere perusal of the book suffices to reveal the fact that considerations of a geographic nature, as such, were not foremost in the mind of its several contributors. Nevertheless, it often happens that the geographer is enabled to add to his store of information by having recourse to the results obtained by trained men of the type present in Sir William Willcocks's parties. An excellent instance in point is that of appendices C and F dealing with the agricultural possibilities of Mesopotamia. Both contain material of value. The contents of appendices D and E will likewise appeal to the student of climatology despite their brevity. A note of human interest is awakened by this report on the present effort to reclaim this region's former economic importance.

Leon Dominian.

EUROPE

Edinburgh Revisited. By James Bone. Drawings by Hanslip Fletcher. viii and 263 pp. Ills. J. B. Lippincott Co., Philadelphia, 1911. $5. 11½ x 9.

A particular surprise awaits the reader of this volume. Certainly it does bear the outward guise of an ornamental book, a parlor table luxury; yet it is necessary to read but a few pages at random to discover that the author had a worthy purpose and that he has carried it out with careful attention, that the work of the draughtsman is narrowly held to the same theme, and it must be confessed that the subjugation of the illustrator is the greatest victory of the author. With the acute perception of the trained builder, Mr. Bone has been prowling in the dark rooms of old Edinburgh, back in the wynds, up the dark stairs of many lands now given over to the poor but holding still in their shabby estate the remnant of the ornament which once was decoration for earl and parliament man and fine lady of the court. He has written in intimate detail a most agreeable record of much that few who live all their days in Edinburgh have ever seen. WILLIAM CHURCHILL.

ANTHROPOLOGY

Ancient Hunters, and their modern Representatives. By W. J. Sollas. xvi and 416 pp. Maps, ills., index. Macmillan & Co., Ltd., London, 1911. $4. 9 x 6.

Studies in prehistoric anthropology have been accelerated, during the last few years, by the discovery of a number of skeletal remains of man. This book is an account of these findings which have modified the theory of the antiquity of the human race. The story is presented in a vivid way with the aid of an ingenious comparison of the ancient dwellers of the earth with their modern representatives. The real discussion opens with a chapter on the extinct Tasmanians which the author asserts were a Paleolithic or even an earlier race, although they lived recently. The Lower Paleolithic conditions include the Mesvinian, Strepyan, Chellan and the Acheulean stages of culture and a brief description of these introduces the readers to the most ancient hunters.

The record of the Mousterians of the Mid-paleolithic is more complete. The story is told of the Australian aborigines, "the Mousterians of the Antipodes." "If, as we have supposed, the Tasmanians were driven out of Australia by a Paleolithic race, now represented by the Australians, it is evident that the two most divergent sub-divisions of the human family, that is, the Cymotrichi (wavy haired) and the Ulotrichi (twisted haired) were already in existence at a very early date." In the treatment of the Upper Paleolithic, the Aurignacian stage is described by citing the history of many stations in Europe. The introduction of the art of expression by pictures forms an interesting phase of this age. The modern representatives of the Aurignacians are the Bushmen. The Magdalenian man, the next in order, seems to have been the ancient representative of the Eskimo, a dweller on a tundra which bordered a cold ocean, and the comparison between these two races so far apart as to time and so near as to accomplishments and customs is a fascinating study. Introductory to all this history the author describes the Great Ice Age; and the division of time into eight ages, four glacial which mark the advances of the ice and four genial which mark its retreats, provides him with a chronological scale to which the events of the early history are referred. The chronology is attempted in the last chapter. The author admits no positive evidence of the existence of man preceding the Pleistocene. The book contains many illustrations and is a very instructive survey of prehistorical archæology. ROBERT M. BROWN.

Kulturelemente der Menschheit. Anfänge und Urformen der materiellen Kultur. Von Dr. Karl Weule. 94 pp. Ills. Kosmos Gesellschaft der Naturfreunde. Franckh'sche Verlagshandlung, Stuttgart, 1910. Mk. 1.80. 8½ x 5.

Within such narrow compass this little volume can pretend to no higher estate than that of a primer introductory to the great and rapidly growing science of the comprehension of primitive man. But as primer it is interesting to set it in comparison with a series of similar primers in English now appearing under high university sanction. Of this series it has been said that each primer is so accurate and at the same time so condensed as to be quite beyond the powers of any but the leaders of the science. This German primer, on the other hand, in common with at least ten others produced under the sanction of the Kosmos Society of Stuttgart, is essentially narrative. The purpose of each, in strong contradistinction from the English model of the science primer, is expressly to present an interesting story of the science in such simple form as shall attract the attention of the reader, to give him to understand what a worthy theme awaits his future study in case he shall so elect. In such presentation there is necessarily nothing that is new, essentially there is no place for the controversial topics. Even should the reader go no further than this plain presentation of the objects of study in the life of early societies, we can see how such a primer would make for the betterment of general knowledge.

WILLIAM CHURCHILL.

ECONOMIC GEOGRAPHY

The American Transportation Question. By Samuel O. Dunn. xi and 290 pp. Index. D. Appleton & Co., New York, 1912. $1.50. 7½ x 5.

This collection of articles and lectures by Mr. Dunn is a timely contribution on the economics of railroad operation in the United States. The author correctly assumes the cost and the value of the carrier's service to be fundamental principles of ratemaking. These factors are not considered from the standpoint of abstract theory but as deductions of concrete investigations of railroad management in the United States.

The statistics given in two chapters on efficiency are instructive. The lower rate of the cost of construction per mile of railroads in the United States as compared with European railroads, as well as the lower capitalization per mile of track in this country, reveal the relatively advanced stage of railroad management in the United States. With regard to the relation of efficiency to economy or to public service the data used have been culled from all over the world. Mr. Dunn deserves credit for assembling these figures, which speak well again in favor of American roads.

As regards the dissimilarity of conditions in the old and new world, the author seems not to concede enough importance to the fact that, while European roads are generally planned to meet the requirements of transportation, American roads are often, on the other hand, built to create traffic. The significance of the resulting geographic problems is plain to all who have travelled in our West, where the laying of tracks has contributed in more than one instance to the peopling of barren expanses.

Some interesting facts in economic geography may be gleaned from the chapter on railroads and inland waterways. The impression conveyed is that of a decided bias in favor of the latter. True, it is shown that arguments based on the economic development of waterways in Europe cannot be made to apply conclusively to conditions in the United States, where railroad transportation rates are almost as low as the usual European canal or river rates. At the same time, the importance of inland waterways in the transportation of non-perishable commodities that do not require rapid moving has not been brought out with sufficient force to demonstrate how a preventative against excessive railroad rates can be thereby assured. Here the need of regulation becomes apparent at once. The last two chapters are devoted to a study of Government regulation, the subject being treated both as applying to American conditions and from the standpoint of the general principles by which it is affected. The author lucidly presents the main facts involved in this complex problem. His views on the personnel of State railroad Commissions are sound. Neither the cowboy who has "killed his man" nor the brakeman who has lost both legs in a railroad accident are persons to whom the solving of regulation problems can be satisfactorily entrusted.

LEON DOMINIAN.

EDUCATIONAL GEOGRAPHY

Der wetterkundliche Unterricht: Ein systematischer Lehrgang. Von Dr. Franz Linke in Gemeinschaft mit Jacob Clössner. 2. und 3. durchgesehene Auflage. viii and 177 pp. Ills. Franz Auffahrt, Frankfurt am Main, 1912. Mk. 3.50. 9 x 5½.

Since the publication, in 1909, of Ward's "Practical Exercises in Elementary Meteorology," we have had no book devoted entirely to the subject of the meteorological work which may be undertaken during the school years. With a keen appreciation of the value of elementary meteorology as a disciplinary study, and of the importance of the subject in everyday life, the authors of the present volume have given us a well-arranged outline of the work which may be undertaken during nine years of the school course. From the simplest weather observations the scholar is led on through the graphic presentation of his data to the study of the daily weather maps—a logical order which, under the guidance of a good teacher, cannot fail to interest the children. The book is, of course, especially adapted for use in German, but the general scheme of work might be followed anywhere with distinct advantage. R. DeC. Ward.

Compendium of Mathematical, Physical and Political Geography. [In Yiddish.] By Alexander Harkavy. Vol. I, xv and 358 pp. Vol. II, xii and 414 pp. Ills., index. Hebrew Publishing Co., New York, 1911. $1. 8 x 5½.

This elementary geographical work is in many respects exceptional, even unique. It is written not only in a very peculiar language, a Judeo-German dialect, commonly called Yiddish (also Jargon), and spoken at present by about three-fourths of the Jewish people, but also with quite a different object than the usual elementary geographies in any other living language. The author had in view grown-up people, fathers and mothers, but not school children. In his preface he calls attention to the exceptional condition of the Yiddish literature, that "while it is relatively rich in compilations on speculative subjects, on history, political economy, philosophy, etc., it is very poor in works on elementary knowledge, which is the foundation of education and a necessary introduction to such high subjects." Then he adds that there is an especial lack in writings on elementary geographical subjects in Yiddish.

This is remarkable indeed. It seems incredible to a stranger, not only to a Gentile, but even to a Jew who is not familiar with the Yiddish literature. Mr. Harkavy, who is well known among Jews as an author of educational books, especially of dictionaries, gives one, the most important explanation of this striking fact, when he says in his preface that "in compiling this geography the author took into consideration that the persons who would make use of it will have to be their own teachers, and he, therefore, arranged it on broader lines than geographies for school, adapted specially for such of our people as did not receive the ordinary elementary education in public schools."

At any rate, credit must be given to Mr. Harkavy for his efforts to compile not only an elementary geography for grown-up people, but to use such popular expressions as to be understood by persons who have no more knowledge of geography than their children, when they begin to learn in schools this most necessary and useful subject. Let the reader imagine a geography, written for such English-speaking folk as have never attended public school, never been taught elementary geography, history, grammar, or even arithmetic, and he will understand what difficulties Mr. Harkavy had to overcome in his work. Very often he has had to coin new terms, to create new expressions. Mr. Harkavy made use of quite a number of geographies in the different languages which he masters. He had in view mostly Yiddish readers in United States, Canada and English-speaking countries generally, as the English words in parentheses show. Of the two volumes the first contains the mathematical, cosmographic and physical parts. The second volume is devoted to political geography, the United States occupying the first and most prominent space. It is a very useful book for Yiddish readers. Jacob Rombro.

HISTORICAL GEOGRAPHY

A Commentary on Herodotus. With Introduction and Appendices by W. W. How and J. Wells. Vol. I (Books I–IV), xii and 446 pp.; maps. Vol. II (Books V–IX), viii and 423 pp.; maps. Clarendon Press, Oxford, 1912. $2.50 for each vol. 7½ x 5½ each.

In connection with the academic end to which the volumes of this commentary are addressed the authorities upon classical studies will pass judgment upon the material here richly provided. But is the academic the better attitude in which to present Herodotus to the young men of the universities? Wiser by centuries than his critics, Herodotus traveled and recorded. Long disbelieved, he is coming into his own; modern exploration is confirming the essentials of his record. We should like to have a commentary on Herodotus which assumes the Greek grammar as otherwise acquired, which illuminates his statements with the wealth of modern discovery. Evidently, Oxonian scholarship has not yet left its schools and come up into the clearer air, for in these two volumes the specific treatise upon Herodotus as the first of the great world geographers would fill less than four pages of this *Bulletin.* The specific detail is equally jejune. We note, just by way of a single example, the treatment of the passage in the first book where Herodotus speaks of the tangle of Euphratean canals at Ardericca where the waterway is so tortuous that the voyager passes the same village three times in three days. The commentators, like most of their academic tribe, adopt the explanation that "he accepted this statement from some waggish fellow-traveler, who hoaxed him." Fortunately, they have subjoined Matzat's diagram showing how this might be possible without recourse to the ancient theory that Herodotus was easily gulled. WILLIAM CHURCHILL.

Korte Historiael ende Journaels aenteyckeninge van verscheyden Voyagiens in de vier deelen des wereldts-Ronde, als Europa, Africa, Asia, ende Amerika. gedaen door d. David Pietersz. de Vries. Uitgegeven door Dr. H. T. Colenbrander. Maps, ills., index. Linschoten Vereeniging, 1911. Martinus Nijhoff, The Hague, 1911. 10 gulden. 10 x 6½.

In this volume the Linschoten Vereeniging (Association of Linschoten), a scientific society which, like the famous English Hakluyt Society, is publishing in the original tongue, hitherto unpublished and rare descriptions of Netherlandish sea and land voyages as also contributions to geography and ethnology, has brought into the market a book which must be considered one of the most valuable contributions not only to historical geography as such, but to the history of early America in particular. The book deals with the diary of David Pietersz. de Vries (born about 1592 or 1593), "artillery master," seaman and merchant-adventurer, who during the years 1618 to 1644 made seven voyages to New Netherland and Guiana.

Of the work here reproduced, only one copy is known to exist in Europe, that in the Museum Meerman at the Hague, all others that have occasionally come to hand having been eagerly purchased by lovers of rare books in the United States. In this country, attention to De Vries' voyages was first directed in 1841 through the publication of some passages from it in the "Collections of the New York Historical Society." Somewhat later, in 1853, Brodhead mentioned de Vries' voyages in the first volume of his "History of the State of New York," and in the same year H. C. Murphy issued part of the diary in "Voyages from Holland to America 1632 to 1644"; finally, J. Franklin Jameson, in "Narratives of New Netherland" (New York, 1909) makes ample use of the great Hollander.

For the history of the early settlements in America his fifth, sixth and seventh voyages are of greatest interest, because they lead us to the time when the State of Delaware was founded (the Delaware river bore at that time the name "Zuid-Rivier," while the Connecticut was called "Versche Rivier"); and to the times of the conflicts of the settlers with the natives. It is of interest to read what de Vries has to say about the Indian massacre of February, 1643. In comparing the English colonists of Puritan stock with the Dutch, de Vries declares the former to be far better material than his own countrymen, because the latter were too much addicted to intoxicants.

The limited length of this review forbids me to enter into details of de Vries' narratives. It must be read from cover to cover in order to be appreciated. The book has a number of plates, illustrating scenery, customs and manners of the people he saw and a reproduction of Adriaan van der Donck's map of New Netherland, 1656. A few poems by friends of de Vries, preceding the text of the diary, bear witness that he was considered among his own people one of their worthiest and most respected members. CHARLES L. HENNING.

PHYSICAL GEOGRAPHY

Kaysers Physik des Meeres. Zweite Auflage, neubearbeitet von Dr. Carl Forch. Mit einem Beitrag über die leuchtenden Meeresorganismen von Prof. Dr. Paul Zenetti. viii and 384. Ills., index. Ferdinand Schöningh, Paderborn, 1911. 6 mks. 48 pfg. 9 x 6.

The first edition of this popular, scientific book on oceanic physiography appeared some thirty years ago, when oceanography was still in its infancy. Since that time a number of most important voyages and exploring expeditions have occurred above all the voyages of H. M. S. *Challenger,* the U. S. Coast and Geodetic Survey steamer *Blake,* the Plankton Expedition and others, which have contributed largely to our knowledge of the deep sea and its life.

Kayser's book is written in popular style and will be useful to all who are interested in the subject, but who have not access to the standard work by Otto Krümmel, "Handbuch der Ozeanographie," the second edition of which has appeared in two volumes (Stuttgart, J. Engelhorn, 1911). The chapters deal with the distribution of land and sea in the present geological epoch as well as in previous periods of the history of our globe, with the chemical and physical properties of sea-water, with tides and currents, and with the description of the apparatus used in deep-sea exploration. The chapter on the phosphorescence of the sea by Zenetti will doubtless help to elucidate that great phenomenon. Forch urges that what is most needed at the present time is systematic exploration of the great oceans in our latitudes; that is to say, of the North Atlantic from the equator to 60° lat. N. In doing so there would be gained better results than in exploring the Arctic or Antarctic. CHARLES L. HENNING.

La Face de la Terre (Das Antlitz der Erde). Par Ed. Suess. Traduit sous la direction de Emm. de Margerie. Tome 3 (2e partie). pp. 531–956. Maps, ills. Armand Colin, Paris, 1911. Fr. 12. 10 x 6½.

The penultimate volume of the French translation of this synthetic masterpiece bespeaks anew Mr. de Margerie's thorough communion with the scientific spirit that has presided over Suess's comprehensive survey of the surface of our planet. The translator and his staff of collaborators have not confined themselves to the mere transposition of the original. They have added to the value of the work by widening its field of reference. The copious foot-notes appended on their own initiative enhance in no slight degree the accuracy of the author's well-grounded insight into the general conformation of the earth while serving to bring the treatise up to date.

This new material often consists of condensed comment suggested by recent available results of international research. It is enclosed in square brackets to distinguish it from the foot-notes accompanying the original. In particular, the detail work of French scientists in Africa, that of Americans in America, thus referred to, throws much brighter light on our knowledge of the American and African Altaides. The correlation of the Variscan-Armorican arc with the paleozoic field of north-eastern North America is also presented with considerable conclusive evidence.

Similar contributions to the chapter on the Western Alps afford a clearer outlook on their tectonic character. In some cases the interpreter has succeeded in defining with greater accuracy the geological regions which the author has abstained from delimitating, as in the case of the Flysch zone, lying east of the Vesubian spur, in the vicinity of the Franco-Italian frontier. The whole tone of the work is permeated by a strong literary flavor which is both in keeping with the spirit of the subject and the best traditions of French scientific writings.

LEON DOMINIAN.

Studies in Terrestrial Magnetism. By Charles Chree, F.R.S., Superintendent of Kew Observatory. London, Macmillan & Co., Ltd., 1912. 8vo. Pp. xii and 206. Price $1.60 net.

Dr. Chree is well known as an active original investigator of the phenomena of terrestrial magnetism, and is admirably qualified to prepare the text on this subject for *Macmillan's Science Monographs.* The author distinctly says that his volume is not intended to be a text-book, nor is it intended to summarize existing knowledge in the branches of terrestrial magnetism with which it deals. Dr. Chree's object is to give an account of his own original work, "referring to the work of others only so far as is necessary for intelligibility." Facts, or, as the author frankly states, "supposed facts," and not theories as to the origin of magnetic changes are dealt with. In the opinion of the author, theorizing is less likely to be of advantage in the present stage of study than is the extension of positive knowledge. All this is very refreshing and delightfully frank as a statement of Dr. Chree's point of view in writing the volume. The book, while thus somewhat limited in the field which it is designed to cover, will, we feel sure, prove very welcome to all who are interested in this important subject.

R. DeC. Ward.

GENERAL

Distribution and Origin of Life in America. By Robert Francis Scharff. xvi and 497 pp. Maps, index. The Macmillan Co., New York, 1912. $3. 9 x 6.

Dr. Scharff has failed to make interesting this extremely valuable volume upon a subject which in itself must prove of the utmost interest to geographers. In such work as this we find our field widened, the acre of to-day, no matter the method of earth-science whereby we study it, becomes a more thrilling space when we have unfolded from the mere acre the history of the paleoarchaic continent of which it may be but the sole survival. The author has already performed similar service for the Eurasian land-mass. In this volume he restores not one but several continental arrangements of land-mass of which the survival may through his careful method of research be detected in one or the other of the Americas of our present knowledge. It is not easy to follow the argument; the mass of detail is very great, its magnitude is a triumph of research, but in this work its treatment is so minutely in detail that it calls for very close observation to dig out the broad conclusions of the study. It was probably necessary to provide for all such criticism of the argument as might be foreseen by the author. It is clear that he felt an obligation to dissect the bearing of each of the data amounting to thousands which he has here assembled. Working geographers would find richer pleasure in this highly important book if its geographical results had been presented with somewhat more commanding prominence and the minute details of zoological proof had less dominated the foreground. The work is truly encyclopedic as a storehouse of the facts of the zoogeography of the Americas and we look to see its conclusions held fundamental in future treatises upon the ancient geography of the Western World.

William Churchill.

Vergleichende Mond- und Erdkunde. Von Dr. Siegmund Günther. Heft 37. Die Wissenschaft, Sammlung naturwiss. und math. Monographen. xi and 193. Ills., index. Friedr. Vieweg & Sohn, Braunschweig, 1911. 5 mks. 8½ x 5½.

Whenever Günther takes up his pen to write about a subject in geophysics or geography, one may be sure to get the very best. In this volume, being a comparative history of moon and earth, he analyzes, in the first chapter, the various views of classic antiquity in regard to their mutual relationship, from the time of Anaxagoras (500-428 B. C.), who was among the first to pronounce a material unity of the earth, sun, moon and all the other heavenly bodies, down to the present day. The invention of the telescope and spectroscope has made it now an undisputed certainty that the earth and her satellite are of common origin, having the same composition and features. To Galileo, "who has brought the stars nearer to us," and to Kepler, whose posthumous work "Dream of the Moon" (1634) another Günther (L. Günther, Kepler's "Traum vom Monde," 1898) has made popular, the author devotes a special chapter. He calls these two heroes of science by right "the founders of a scientific topography of the moon and the founders of comparative selenography and geography." During the seventeenth and eighteenth centuries, the physical unity of both earth and moon became still more apparent, until in the nineteenth and twentieth centuries, when photography and spectroscopy were placed at the service of astronomy, the question of unity was finally settled as also the fact that the formation of our satellite is due to the activity of cosmic-volcanic energy.

A somewhat fantastic theory, introduced into science about thirty years ago, was to the effect, that all the uneven parts of the moon's surface came into existence through the falling of meteors upon the pliable mass of that body, by means of which action the walls and craters of the moon were formed. This theory has been styled "a bombardment of the moon by meteorites." It has found an advocate in our friend Grove K. Gilbert (The Moon's face; a study of the origin of its features. *Bull. of the Philos. Soc. of Washington,* vol. 12, p. 241 ff). Gilbert discovered a certain agreement with the theory in "Coon Butte," Ariz., which, in his opinion, resembles the moon's craters. Although Gilbert approaches the subject from a more careful standpoint than the anonymous authors of the theory, Günther does not take a positive position concerning it. He says: "The meteoric theory of the moon marks a stage of transition in our knowledge, which, even he who thinks differently, cannot refuse to recognize, because much learning and skill have been devoted to it and have evidently opened new views on a problem in astrophysics, that had arrived at a certain point of stability." Günther concludes his excellent book with the statement that the norms which have been recognized as fully applicable for the volcanic and tectonic phenomena of the earth, can be transferred with certain caution also to our neighboring satellite. CHARLES L. HENNING.

OTHER BOOKS RECEIVED

These notes do not preclude more extended reference later

NORTH AMERICA

THE GEORGIA ANNUAL FOR 1912. A Compendium of Useful Information about Georgia. 252 pp. A. B. Caldwell, Atlanta, Ga., 1912. $3. 9½ x 6½.

STAGE-COACH AND TAVERN DAYS. By Alice Morse Earle. xvi and 449 pp. Ills., index. Macmillan Co., New York, 1912. $1.50. 7½ x 5½. [The carefully prepared story of an important phase of life in the United States before the railroad era; with many incidents, anecdotes and illustrations.]

AFRICA

ANNUAL REPORTS OF THE COLONY OF SOUTHERN NIGERIA FOR THE YEAR 1910. 689, 56, 44, and 26 pp. Maps. Government Printer, Lagos, 1912. 13½ x 8. [The value of the purely commercial imports and exports for Northern and Southern Nigeria together, for 1910 was $49,175,000; for 1906, $27,435,000. These figures do not include government importations, or specie.]

GUIDE-ANNUAIRE DU GOUVERNEMENT GÉNÉRAL DE MADAGASCAR ET DÉPENDANCES. Année 1912. vii and 712 pp. Maps, index. Imprimerie Officielle, Tananarive. 1912. 10 x 6½.

JOHN BOYES, KING OF THE WA-KIKUYU. A True Story of Travel and Adventure in Africa. Written by Himself. Edited by C. W. L. Bulpett. xv and 320 pp. Map, ills., index. Methuen & Co., London, 1911. 12s. 6d. 9 x 5½. [The adventures of Mr. Boyes were quite out of the common. At one time he wielded much influence over the Wa-Kikuyu tribe, living among the foothills of Mt. Kenia. When the British formally brought this region under their domain they arrested the self-anointed potentate and tried him for various crimes and misdemeanors but he was acquitted on all charges.]

SUDAN ALMANAC, 1912. Compiled in the Intelligence Department, Cairo. Astronomical Calculations made in the Egyptian Survey Department, Cairo. 102 pp. Map, diagram, ills. 1s. 5½ x 4. [A valuable compilation of information on the Anglo-Egyptian Sudan.]

ASIA

DIE JAPANER IN DER WELTWIRTSCHAFT. Von Karl Rathgen. In series: Aus Natur und Geisteswelt, Vol. 72. vii and 145 pp. B. G. Teubner, Leipzig, 1911. Mk. 1.25. 7 x 5. [An informing account of the development and present position of Japan in her industrial and commercial relations.]

AUSTRALIA

THE OFFICIAL YEAR BOOK OF NEW SOUTH WALES 1909-10. By John B. Trivett. vii and 634 pp. Map, index. Bureau of Statistics, New South Wales, Sydney, 1911. 10 x 6½. [Among the features of this comprehensive Year Book are statistics dealing with the social condition of the people and the latest approved ideas relating to education.]

EUROPE

CAMBRIDGE COUNTY GEOGRAPHIES. Breconshire. By Christopher H. Evans. xi and 172 pp.; Dumfriesshire. By James King Hewison. ix and 176 pp.; Oxfordshire. By P. H. Ditchfield. xi and 218 pp. University Press, Cambridge, 1912. G. P. Putnam's Sons, New York. 45 cents each. 7½ x 5.

THE STORY OF AVIGNON. By Thomas Okey. Illustrated by Percy Wadham. xiv and 408 pp. Maps, index. J. M. Dent & Sons, Ltd., London, 1911. 4s. 6d. 7 x 4½. [A description chiefly of many events and persons conspicuous in the history of this hill city on the Rhone.]

DIE DEUTSCHEN VOLKSSTÄMME UND LANDSCHAFTEN. Von Prof. Dr. O. Weise. In series: Aus Natur und Geisteswelt, Vol. 16. vi and 108 pp. Map, ills. B. G. Teubner, Leipzig. 1911. Mk. 1.25. 1½ x 5.

GENERAL

ARE THERE EQUINOCTIAL STORMS? Development of the Marine Barometer in American Waters. By John H. Morrison. 30 pp. Wm. F. Sametz Co., New York, 1911. 60 cents. 7 x 5. [The author shows that there is little ground upon which to fasten the old theory of equinoctial storms.]

EISZEIT UND URGESCHICHTE DES MENSCHEN. Nach seinen Vorlesungen von Dr. Hans Pohlig. In series: Wissenschaft und Bildung. 180 pp. Ills., index. Quelle & Meyer, Leipzig, 1911. Mk. 1.25. 7½ x 5. [A discussion of the glacial era and of early Man, popularly presented.]

GRUNDRISS DER ALLGEMEINEN WIRTSCHAFTS- UND VERKEHRS-GEOGRAPHIE. Von Dr. Josef Stoiser. v and 95 pp. Carl Fromme, Wien, 1910. 9½ x 6½. [Fully half of the work is given to Astronomical and Physical Geography, a larger proportion of space than is usually assigned in books of this character. The bases of industrial and commercial geography are admirably summarized.]

POLITISCHE GEOGRAPHIE. Von Dr. Emil Schöne. In series: Aus Natur und Geisteswelt, Vol. 353. vi and 143 pp. Maps. B. G. Teubner, Leipzig, 1911. Mk. 1.25. 7 x 5. [Deals with the origin and the development of States and Colonies after the ideas and methods of Rätzel.]

ÉLÉMENTS DE TOPOGRAPHIE. Cinq Conférences à l'Usage des Candidats au Brevet spécial d'aptitude militaire. Par Robert Altermann. 56 pp. Diagrams. Henri Charles-Lauvauzelle, Paris, 1912. 6½ x 4.

TOPOGRAFIA. By Ing. G. Pigozzi. I: Elementi di Trigonometria Piana, x and 40 pp. II: Planimetria, x and 189 pp. III: Altimetria, ix and 88 pp. IV: Celerimensura, vii and 58 pp. V: Applicazioni, viii and 102 pp. In series: Riassunti per Tutte le Materie d'Esame, Vols. 197-210, Biblioteca degli Studenti. Raffaello Giusti, Leghorn, 1911. 6½ x 4 each. [Clearly written text-books especially intended for students in the secondary schools of Italy.]

CURRENT GEOGRAPHICAL PAPERS

NORTH AMERICA

United States

DARTON, N. H. Economic Geology of Richmond, Va., and Vicinity. 47 pp. Map, ills. *Bull. 483, U. S. Geol. Surv.* 1911.

FEWKES, J. W., A. HRDLIČKA, AND OTHERS. The Problem of the Unity or Plurality and the Probable Place of Origin of the American Aborigines. *Amer. Anthrop.*, Vol. 14, 1912, No. 1, pp. 1-59.

FIPPIN, E. O. The Agriculture of New York. *Journ. of Geogr.*, Vol. 10, 1912, No. 7, pp. 213-219.

FOLLANSBEE, R., AND OTHERS. Hudson Bay Drainage Area in the United States. Ills. *Water-Supply Paper 285, U. S. Geol. Surv.*, pp. 22-89, 1912.

FOLLANSBEE, R., AND OTHERS. Upper Mississippi River Drainage Basin. *Water-Supply Paper 285, U. S. Geol. Surv.*, pp. 90-308. 1912.

FORBES, R. H. Irrigation and Agricultural Practice in Arizona. 83 pp. Maps, ills. *Bull. No. 63, Agric. Exper. Station*, Univ. of Arizona, 1911.

FREEMAN, W. B., AND J. G. MATHERS. Lower Mississippi Basin. Surface Water Supply of U. S., 1910. 91 pp. Ills., index. *Wat.-Supp. Pap. 287, U. S. Geol. Surv.*, 1911.

FULLER, M. L. The New Madrid Earthquake. 119 pp. Maps, ills., diagrams, geol. sections, index. *Bull. 494, U. S. Geol. Surv.*, 1912.

GANNETT, F. The Conservation of Water in Pennsylvania. *Bull. Geogr. Soc. Philadelphia*, Vol. 10, 1912, No. 2, pp. 22-29.

GRAVES, C. B., E. H. EAMES AND OTHERS. Catalogue of the Flowering Plants and Ferns of Connecticut Growing without Cultivation. 569 pp. *Public Doc. No. 47, Bulls. 13-15*, Vol. 3, State Geol. and Nat. Hist. Surv. Hartford, Conn. 1910.

GRIFFITH, W., AND E. T. CONNER. Mining Conditions under the City of Scranton, Pa. 89 pp. Maps and plans in case, ills. *Bull. 25, Bur. of Mines*, Dept. of Interior. Washington, 1912.

HALL, M. R., AND J. G. MATHERS. James River Basin. *Water-Supply Paper 282, U. S. Geol. Surv.*, pp. 20-26. 1912.

HALL, M. R., AND J. G. MATHERS. Roanoke River Basin. *Water-Supply Paper 282, U. S. Geol. Surv.* pp. 27-30. 1912.

HALL, M. R., AND J. G. MATHERS. Savannah River Basin. *Water-Supply Paper 282, U. S. Geol. Surv.* pp. 38-44. 1912.

HARPER, R. M. Preliminary Report on the Peat Deposits of Florida. Map, ills. Reprint from *Third Ann. Rep., Flor. State Geol. Surv.*, 1910, pp. 197-375.

CENTRAL AMERICA AND WEST INDIES

Dominican Republic

STREITBERG, T. La République Dominicaine. *Bull. Soc. Belge. d'Études Col.*, Vol. 19, 1912, No. 3, pp. 223-238.

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NEW MAPS

Edited by the Assistant Editor

System Followed in Listing Maps.

Title. As on original, if possible. If lacking or incomplete, necessary matter enclosed in brackets.

Scale. Natural (unless otherwise on original). If no scale on original, approximate scale enclosed in brackets.

Coordinates. Approximate limiting coordinates of map given except when region explicitly defined by title. Where map-net lacking, coordinates, if possible of determination, given in brackets. All meridians referred to Greenwich. If map not oriented N., orientation given.

Colors. Number of tints of separate symbols, not number of color printings given. Black or basal color not considered a color.

Source. If map separately published, name of institution issuing it, place and date given. If a supplement, title of paper or book, author, periodical, volume, number, year and pages given.

Comment. Descriptive and critical. In brackets.

Regional Classification. Major political divisions the unit, as a rule, except for United States and Canada. Boundaries of continents according to Siever's *Länderkunde*, Kleine Ausgabe.

NORTH AMERICA

Canada

Alberta. Cereal Map of Alberta Showing Acreage under Crop in Each Township in Wheat, Oats, Barley and Flax. Cereal information prepared in the Railway Lands Branch . . . . from data supplied by the Provincial Government. Second edition 1910. 1:792,000. 55⅖° - 49° N.; 117½° - 109½° W. 7 colors. Dept. of the Interior (Ottawa), 1910.

[Circles, differently colored for each cereal, show acreage of each township.]

SOUTH AMERICA

Brazil. Iriri-Curuá-Jamanchim (Xingú- und Tapajozgebiet). Nach der Routenaufnahme 1909 von Fraulein Dr. E. Snethlage bearbeitet und gezeichnet von Dr. Max Mayr, München, 1911. 1:1,000,000. 3° - 7° S.; 56°0′ - 52°34′ W. 1 color. With inset: Übersicht der kartographischen Veränderungen infolge von Frl. Dr. Snethlages Reise, auf Stielers Handatlas Nr. 96. 1:7,500,000. 1 color, Taf. 41, "Die Routenaufnahmen von Dr. A. Snethlage vom Xingú zum Tapajoz" by M. Mayr, *Pet. Mitt.*, Vol. 48, I, April, 1912, pp. 209-213.

[Valuable survey of two hitherto unexplored rivers.]

AFRICA

Cape of Good Hope. Geological Map of the Province of the Cape of Good Hope. 1:238,000. (1) Sheet 19 (Nieuwerust). Geology by A. W. Rogers, 1912 (described in the Annual Reports of the Geol. Comm. for 1904 and 1911). (2) Sheet 26 (Dordrecht-Barkly East). Geology by A. L. Du Toit, 1912 (described in the Annual Reports of the Geol. Comm. for 1903, 1904, 1905, 1910, 1911). Geological Commission of the Cape of Good Hope, Cape Town, 1912.

[For previous maps of this series see under "Cape of Good Hope," *Bull.*, Vol. 43, 1911, p. 472.]

Transvaal. [Geologic map of the Transvaal:] Sheet 9. Marico (Portions of Marico and Rustenburg Districts). Surveyed in 1908-1910. 1:149,000. 25°0′ - 25°30′ S.; 25°30′ - 26°30′ E. 16 colors. Accompanied by "The Geology of the Country Lying Northwards from Zeerust: An Explanation of Sheet 9 (Marico)" by W. A. Humphrey, Geol. Survey [of Transvaal], Mines Dept., Union of South Africa, Pretoria, 1911.

[Previous sheets of this series, with scale incorrectly given, listed under "South Africa" in *Bull.*, Vol. 43, 1911, pp. 159-160.]

Tripolitania. Le Nuove Provincie Italiane Tripolitania e Cirenaica. (Costruita e disegnata da) A(chille) Dardano. 1:2,500,000. 38⅔° - 22⅓° N.; 7½° - 27° E. 13 colors. With three insets: (1) Paesi del Mediterraneo. 1:10,000,000. 12 colors. (2) Tripolitania Settentrionale. 1:1,000,000. 33°16′ - 31°0′ N.; 11°25′ - 16°2′ E. 5 colors. (3) Cirenaica. 1:1,000,000. 33° - 31° N.; 19°40′ - 24°10′ E. 4 colors. Istituto Geografico de Agostini, Novara. In pocket: price L. 2.00.

[Excellent "semi-mural" map bringing out well the salient features of the geography of Tripolitania. On main map and on insets (2) and (3) areas under cultivation and oases in green, separate symbols for steppe, sand desert, pebble desert (*serîr*) and rock desert (*hammáda*). Caravan routes in red, antique names in block letters, tribal names in red.]

ASIA

China. Das Hinterland von Tschifu [Chefoo] (Nordseite der Schantung-Halbinsel). Nach Originalaufnahmen von Walter Anz. 1:300,000. 37°53′ - 36°50′ N.; 119°40′ - 121°39′ E. 4 colors. Taf. 494, "Das Hinterland von Tschifu und die geplante Eisenbahn Tschifu-Weihsien" (last part) by W. Anz, *Pet. Mitt.*, Vol. 58, I, May, 1912, pp. 303-304.

[Valuable map based on original surveys supplementing v. Richthofen's work and correcting the map of "Tchili und Schantung," 1:200,000, published by the Kartogr. Abteilung der kgl. Preussischen Landesaufnahme.]

India. [Eighteen sheets of the] Standard Map of India. 1:63,360. 3-5 colors. Survey of India. Price of each sheet 1 rupee. (1) Sheet No. 38 P:15. Parts of Districts Miánwáli & Sháhpur, Punjab. 1911. 32°30′ - 32°15′ N.; 71°45′ - 72°0′ E. (2) 44 A:3. District Jhang, Punjab. 1911. 31°30′ - 31°15′ N.; 72°0′ - 72°15′ E. (3) 44 A:14. Districts Jhang & Lyallpur. 1911. 31°45′ - 31°30′ N.; 72°45′ - 73°0′ E. (4) 49 M:5. Part of District Malabar, Madras.

1909. 12°0′ - 11°45′ N.; 75°15′ - 75°30′ E. (5) 49 M:9. Part of District Malabar and of Mahé, Madras. 1909. 12°0′ - 11°45′ N.; 75°30′ - 75°45′ E. (6) 49 M:10. Part of District Malabar and of Mahé, Madras. 1910. 11°45′ - 11°30′ N.; 75°30′ - 75°45′ E. (7) 49 M:11. Part of District Malabar, Madras. 1909. 11°30′ - 11°15′ N.; 75°30′ - 75°45′ E. (8) 49 M:13. Part of Coorg and of District Malabar, Madras & Coorg. 1910. 12°0′ - 11°45′ N.; 75°45′ - 76°0′ E. (9) 49 M:14. Part of District Malabar, Madras. 1910. 11°45′ - 11°30′ N.; 75°45′ - 76°0′ E. (10) 49 M:15. Part of District Malabar, Madras. 1909. 11°30′ - 11°15′ N.; 75°45′ - 76°0′ E. (11) 49 M:16. Part of District Malabar, Madras. 1910. 11°15′ - 11°0′ N.; 75°45′ - 76°0′ E. (12) 45 N:13. Part of District Malabar, Madras. 1910. 11°0′ - 10°45′ N.; 75°45′ - 76°0′ E. (13) 49 N:14. Part of District Malabar, Madras. 1910. 10°45′ - 10°30′ N.; 75°45′ - 76°0′ E. (14) 58 A:3. Parts of Districts Malabar & Nilgiri, Madras. 1910. 11°30′ - 11°15′ N.; 76°0′ - 76°15′ E. (15) 58 A:4. Part of District Malabar, Madras. 1910. 11°15′ - 11°0′ N.; 76°0′ - 76°15′ E. (16) 58 A:7. Parts of Districts Malabar and Nilgiri, Madras. 1910. 11°30′ - 11°15′ N.; 76°15′ - 76°30′ E. (17) 58 A:8. Parts of Districts Malabar and Nilgiris, Madras. 1910. 11°15′ - 11°0′ N.; 76°15′ - 76°30′ E. (18) 64 A:15. District Mandlā & Rewah State. 1911. 23°30′ - 23°15′ N.; 80°45′ - 81°0′ E.

[These sheets belong to a new edition of the Standard Map of India, which was formerly published in black, or in black and brown only, in sheets measuring 30′ of longitude by 15′ of latitude. On the present sheets relief is in brown contours, forest and jungle in dark or pale green according to density, perennial waters and canal systems in blue, and cities, village sites and roads in red. Each sheet forms one-sixteenth part of a so-called degree sheet, in the same way as a degree sheet forms one-sixteenth part of a sheet of the Map of India and Adjacent Countries, 1:1,000,000, five sheets of which were listed in the June *Bull.*, p. 478. For by far the greater part of India the sheets in the old form (the dates of survey vary from 1850 to 1904) are still the only one-inch-to-the-mile maps available, and this will be the case for many years to come.]

JAPAN. [Three sheets of the topographic map of Japan.] 1:200,000. 2 colors. (1) Hiroshima (Zone 7. Col. V). 34°30′ - 34°0′ N.; 132° - 133° E. (2) Ichinohe (Zone 19. Col. XIV). 40°30′ - 40°0′ N.; 141° - 142° E. (3) Shichinohe. 41°0′ - 40°30′ N.; 141° - 142° E. Imperial Geological Survey of Japan, Tokyo, 1911.

[Relief in gray contours, interval 40 meters; drainage in light blue. For previous sheets see *Bull.*, Vol. 40, 1908, p. 697 and Vol. 42, 1910, p. 800.]

JAPAN. Geological Map [of Japan]. Division II. Original survey published in 1887. Revised [edition]. Published in 1911. 1:400,000. 38°30′ - 34°25′ N.; 137°55′ - 141°15′ E. 18 colors. With two insets: (1) Izu Shichito. 1:1,600,000. 35°0′ - 32°10′ N.; 139°0′ - 140°10′ E. 1 color. (2) Ogasawara Jima. 1:1,600,000. 28°10′ - 26°30′ N.; 141°50′ - 142°35′ E. 1 color. In 6 sheets. Imperial Geological Survey of Japan, Tokyo, 1911.

[Valuable geological map of central Japan, superimposed on topographic map with relief in contours. For geologic maps of the whole of Japan, see *Bull.*, Vol. 43, 1911, p. 709.]

JAPAN. Mineral Distribution of Japanese Empire. 1:2,000,000. 48° - 29° N.; 121° - 149° E. 35 colors. With four insets: (1) [Taiwan (Formosa)]. 1:4,000,000. (2) [Southern Manchuria]. 1:4,000,000. 44° - 38⅓° N.; 120⅔° - 127° E. 5 colors. (3) General Map of Japanese Empire. 1:12,000,000. In 4 sheets. Accompanied by a leaflet entitled "Distribution of Minerals in the Japanese Empire and the Corean Peninsula," 4 pp. Imperial Geological Survey of Japan, Tokyo, Sept., 1911.

[Quantity of mineral production indicated symbolically by rectangles in color referring to a table printed on the map. Geological boundaries given in regions of mineralogic interest.]

AUSTRALASIA AND OCEANIA

SAMOAN ISLANDS. Die Nordamerikanischen Samoa-Inseln. Nach Aufnahmen von Dr. Kurt Wegener. (a) Manua [Group]. 1:100,000. 14°10′ - 14°17′ S.;

169°43′-169°27′ W. 1 color. (b) Tutuila. 1:100,000. 14°15′-14°24′ S.; 170°53′-170°31′ W. 1 color. Taf. 40, "Die nordamerikanischen Samoainselgruppen Tutuila und Manua" by K. Wegener, *Pet. Mitt.*, Vol. 58, I, April, 1912, pp. 208-209.

[Both maps reproduced in July *Bull.* with detailed comment, pp. 506-512.]

EUROPE

AUSTRIA. Gesamtplan von Wien. 1:25,000. 13 colors. With one inset: I. Bezirk. Innere Stadt. 1:12,500. 8 colors. G. Freytag & Berndt, Vienna.

[Excellent map of Vienna and environs showing built-up areas (public buildings differentiated), cemeteries, parks, meadow land, vineyards and forest, as well as the administrative divisions of the city and its transportation lines.]

AUSTRIA. Plan der Grossgemeinde Wien. Bezirke I-XXI. Ausgabe 1911. 1:25,000. 12 colors. Artaria & Co., Vienna, 1911.

[A map similar in scope to that listed above, although not quite as good in execution.]

AUSTRIA. (a) Karte der Raxalpe. Für Touristen bearbeitet von Gustav Freytag. Terrain auf Grundlage der Originalaufnahme des k. u. k. Militärgeographischen Institutes von Hans Rohn. 1:25,000. [47°46′-47°38′ N.; 15°38′-15°50′ E.] 5 colors. G. Freytag & Berndt, Vienna.

(b) Karte der Lechtaler-Alpen. Aufnahme von L. Aegerter mit Benützung der k. k. Kataster Triangulation. 1:25,000. 47°16.2′-47°7.6′ N.; 10°18.0′-10°34.7′ E. 3 colors. Published by the Deutscher u. Oesterreichischer Alpen Verein, 1911; engraved by G. Freytag & Berndt, Vienna.

[Two excellent maps in the style of the maps of portions of the Austrian Alps published by the German and Austrian Alpine Club and similar in execution to the 1:25,000 and 1:50,000 sheets of Switzerland. Bare rock in black, contours in brown (on glaciers in blue) and drainage in blue. Contour interval on map (a) 10 meters, on map (b) 20 meters.]

IRELAND. Bartholomew's "Quarter Inch to Mile" Map of Ireland., Sheet 2: Belfast & N. E. Counties. 1:253,440. 55°23′-53°51′ N.; 7°15′-6°24′ W. 9 colors. With inset map of Belfast. 1:20,000. The Edinburgh Geographical Institute, Edinburgh.

[Previous sheets of this excellent series of maps with hypsometric coloring listed, with comment, under "England," *Bull.*, Vol. 43, 1911, p. 958 and under "Scotland," *Bull.*, Vol. 44, 1912, p. 319.]

ITALY. (a) Carta Corografia della Provincia di Catanzaro. 1:250,000. 39°27′-38°25′ N.; 15°48′-17°15′ E. 5 colors. Price L. 1.00. (b) Carta Corografica della Provincia di Reggio Calabria. 1:250,000. 38°40′-37°51′ N.; 15°32′-16°39′ E. 5 colors. Price L. 0.75. Istituto Geografico de Agostini, Novara.

[Extracts from the map of Italy published by the Italian Touring Club. Fully equal to the best German maps, especially in the treatment of relief. *Routes carossables* are shown in red, others, including mule paths, in black.]

WESTERN EUROPE. Karte der Häufigkeit der Schwankungen um den Frostpunkt [in western Europe]. Gezeichnet von Paul Schröder. 1:15,000,000. 72°-40° N.; 15° W.-37° E. 5 colors. Accompanies, as Taf. 47, article with same title by same author, *Pet. Mitt.*, Vol. 58, I, May, 1912, pp. 266-267.

WORLD AND LARGER PARTS

NORTHEASTERN AFRICA-ARABIA. Mar Rosso e Possedimenti Italiani in Africa. Mercator's Projection: mean meridional scale 1:4,500,000. 32°15′-12°0′ N.; 29°45′-46°40′ E. 6 colors. With two insets: (1) Possedimenti Italiani in Africa. 1:24,000,000. (2) Massaua e dintorni. 1:75,000. 15°36′ N. and 39°26′ E. 4 colors. Istituto Geografico de Agostini, Novara.

[Shows railroads, telegraph lines, cables, lighthouse and wireless telegraph stations, but no relief.]

WORLD. Die Flächengliederung der Erdteile. Entworfen von Dr. P. Seyferth. 1:60,000,000. 2 colors. Taf. 44, "Die Gliederung der Erdteile" by P. Seyferth, *Pet. Mitt.,* Vol. 58, I, May, 1912, pp. 249-253.

[Outlines of the five continents (Eurasia counted as one) to illustrate a new method of determining the ratio of the trunks of the continents to their members.]

POLAR

ARCTIC. Die für 1912-14 geplanten Nordpolarforschungen. 1:30,000,000. Polar cap within 50° N. 3 colors. Taf. 47, "Die geplante dänische Expedition nach Königin-Luise-Land und quer über das Inlandeis Nordgrönlands 1912/13" by J. P. Kort, *Pet. Mitt.,* Vol. 58, I, May, 1912, pp. 265-266.

EDUCATIONAL

BRITISH EMPIRE. [Four school wall maps with physical coloring entitled:] (a) Bacon's Excelsior Map of Ireland with the Adjacent Coasts of Great Britain by G. W. Bacon, F.R.G.S. 1:760,000. 55°30′ - 51°10′ N.; 12°0′ - 2°40′ W. 10 colors.

(b) Bacon's Excelsior Map of the Dominion of Canada by G. W. Bacon, F.R.G.S. [1:5,700,000]. 79° - 40° N.; 170° - 40° W. 11 colors. With one inset: Newfoundland. 1:6,500,000. 7 colors.

(c) Bacon's Excelsior Map of Australasia. (Contour Edition). [Mercator's projection: equatorial scale 1:5,800,000]. 2° N.-50° S.; 101° - 180° E. 11 colors. With inset map of England and Wales on same scale for comparison. In 4 sheets.

(d) Bacon's Excelsior Map of New Zealand (Contour Edition). 1:1,000,000. 34½° - 47° S.; 166¼° - 179¼° E. 13 colors. With three insets: (1) Chatham Islands. 1:1,000,000. 44° S. and 176½° W. (2) Oceania Showing Its Relation to the Continent of Asia. [Mercator's projection: equatorial scale 1:13,500,000]. 42° N. - 52° S.; 79° E. - 178° W. 4 colors. (3) Map Showing the Routes Round the World. [Mercator's projection: equatorial scale 1:41,000,000]. 3 colors.

In series: Bacon's Excelsior School Wall Maps, Orographical Contour Coloring. G. W. Bacon and Co., Ltd., London. Price: maps of Ireland and Canada, 7s 6d each, of Australasia and of New Zealand, 16s each.

[A very fair series of school wall maps with physical coloring illustrative of the growing influence upon educational publishers of the higher standards in geographical teaching in Great Britain.

The color scheme is, on the whole, well-chosen, although the use of green on maps (c) and (d) for the lowest depths does not seem felicitous. The nomenclature, however, is not critical, being merely an enlargement of the names that would appear on the same maps if drawn on a smaller scale and intended for close consultation.

Both islands of New Zealand on one map have heretofore not been available in this form.]

WORLD, ETC. Oxford Outline Maps: Edited by Prof. A. J. Herbertson, M.A. Drawn by B. V. Darbishire. (1) The World (Western and Eastern Hemispheres). Lambert's Azimuthal Equal Area Net. 1:100,000,000. (2) The World (Polar Hemispheres). Lambert's Azimuthal Equal Area Net. 1:100,000,000. (3) The World: Mollweide's Elliptical Equal Area Net. 1:100,000,000. (4) [Western Europe:] Outlines for Weather Map. [1:15,000,000]. (5) [Great Britain:] Outlines for Climate Map. 1:5,000,000. (6) Contour Map Exercise. Devised by Dr. H. R. Mill. [1:316,800]. Clarendon Press, Oxford. Price 1d each.

[An excellent series of outline maps exhibiting the soundness in educational method lacking in the similar American series reviewed in the *Bull.,* Vol. 43, 1911, pp. 712-713. Map (6) is an ingenious diagram showing a great number of dots, with the elevation or depth of the points they represent, from which a contour map, with altitude tints, of the region is to be reconstructed and two sections to be drawn along lines indicated. From this map the physical features of the region are to be described and the probable geological structure, latitude, climate and products to be deduced. Other maps of this series are in preparation.]

BULLETIN

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Vol. XLIV 1912 No. 10

A JOURNEY IN THE LIBYAN DESERT

BY

GODFREY SYKES
Desert Laboratory, Tucson, Arizona

It is probable that some portions of the depressed areas in the Libyan desert have been the scenes of human activity and habitation from very remote periods, and although existence there must always have been arduous and precarious, the human pressure in the more habitable but circumscribed regions of the Nile Valley and Delta would tend to force the weaker people thereto.

This generalization, however, perhaps expresses but one half of the incentive which forces human beings into such inhospitable regions, for it is also evident that the man of exceptional enterprise and vigor, finding his opportunities becoming few and inadequate in locations such as the Nile Valley, where every pint of available water and every foot of available land is already performing its appointed part in the sustenance of life, will also be attracted by the desert, with its vast expanses and indefinite but ever possible opportunities for exploration and adventure. Of all the arid regions in the world, the Libyan desert is one of the most inhospitable, and were it not for the few depressed areas which are rather loosely termed "oases," it would still exist as an absolute, instead of only a partial *terra incognita*.

In the course of the general study of desert conditions and of the capacity of arid regions to support life, which has been undertaken by the Desert Laboratory of the Carnegie Institution of Washington, it has become obvious that little has been done so far in making adequate scientific comparison between the more important desert areas. The need for such comparison was the incentive which led to the organization of an expedition in the winter of 1911-1912, consisting of Dr. D. T. MacDougal, the Director of the Department of Botanical Research of the Institution, together with the writer, which had for its object the examination of that portion of the Lybian desert

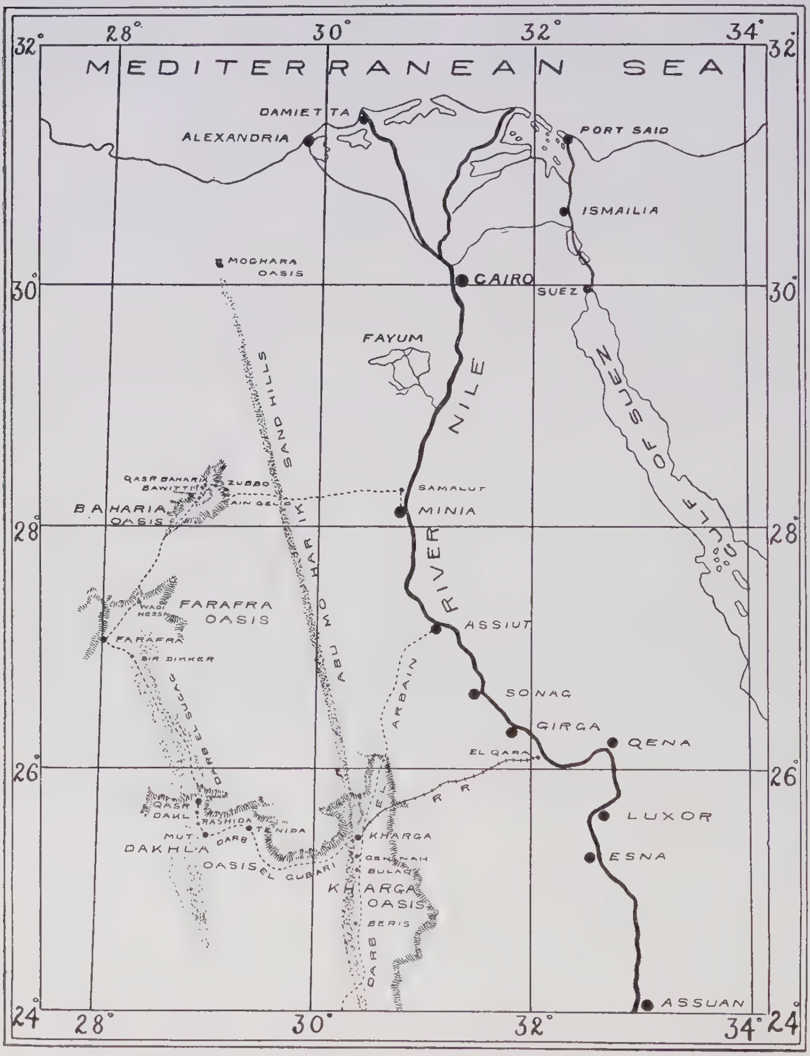

FIG. 1—Outline Map of Egypt showing position of the "inner oases" of the Libyan desert. Compiled from official maps and personal notes by Godfrey Sykes.

situated between the 25° and 29° N. Lat., and extending as far West as the 28th meridian. This area contains the main Eastern Oases: Kharga, Dakhla, Farafra and Baharia, and it was hoped that the examination of these several oases, and of the caravan routes connecting them with the Nile and with each other, would afford a sufficiently comprehensive idea of the topography and general conditions of the region.

The authentic history of the Libyan Oases can be traced back as far as the XVIIIth Dynasty (1545-1350 B. C.), but is fragmentary until the Roman period, when extensive engineering works, planned for the development and conservation of the water supply, were carried out by these energetic colonizers. After the Mohammedan conquest and conversion of Egypt, there seems to have been a general neglect of all the oases, and a failure on the part of either the dwellers therein or of the rulers of the country to keep in repair or further develop the various works which the Roman conquerors had so well begun.

At all periods the remoteness and inaccessibility of these habitable areas seems to have been responsible for their use as places of banishment for political, and other offenders.

A stele discovered at Luxor, and described by Brugsch, has indicated that this had been the custom long anterior to the time of 1033 B. C.

Juvenal, the poet, and Bishop Nestorius, were both prisoners in the Great Oases, and even under the present régime a detention settlement is maintained a few miles north of Kharga, in which undesirables are forced to reside. During the Middle Ages, geographical knowledge of the Libyan desert seems to have been both scanty and faulty, and the map of Castaldi, here reproduced, will serve to illustrate the local knowledge of the cartographer of the sixteenth century. Authentic modern knowledge of the region only dates back to Cailliaud, Edmonstone, and Hoskins, who all visited it early in the Nineteenth Century, and has been added to since by Rohlfs, Schweinfurth, Lyons and others.

The Egyptian Government has also made accurate but, unfortunately, very incomplete surveys of the several oases and of some of the caravan routes, the work having been done by Ball, Beadnell and others, and the results have been embodied in various government reports, but as the work had perforce to be done somewhat hurriedly and was confined in the main to meander-surveys along the caravan routes, with some plane-table work in the vicinity of the different villages, the maps of the region are still far from being satisfactory, and the difficulties of travel are such that it will probably be many years before our knowledge of the country is at all complete.

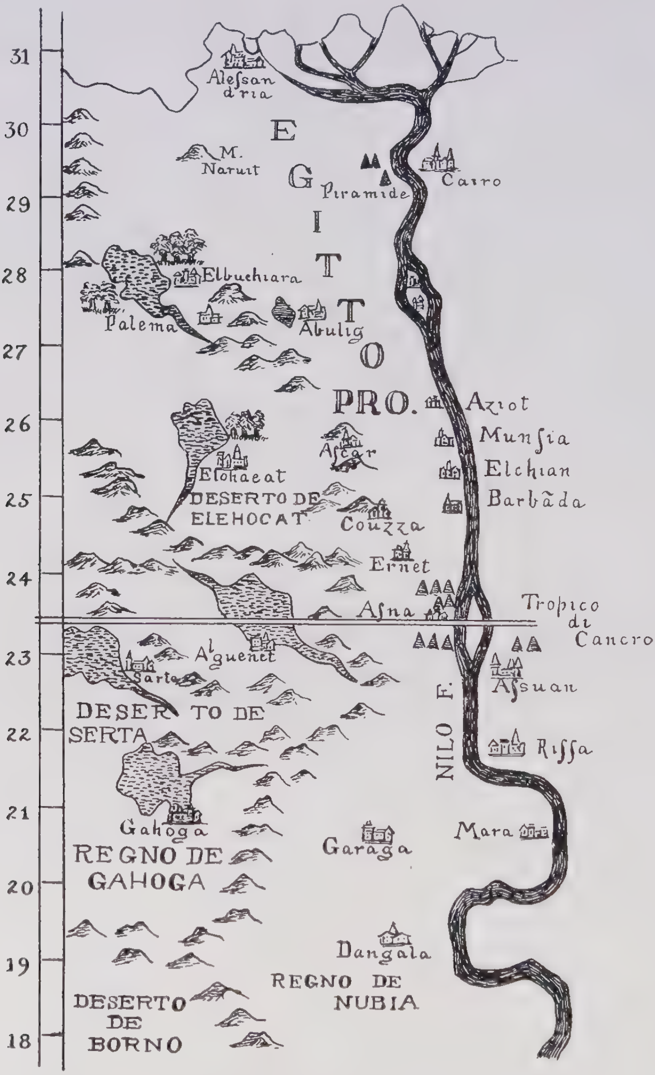

FIG. 2—Copy of a map of 1561 in the British Museum showing the oases of the Libyan desert. (Giacomo di Casteldi Piedmontese cosmografico in Venetia. Brit. Museum, K-44, 1561.)

The earliest inhabitants of the oasis areas no doubt obtained sufficient water from springs and natural outflows, but even admitting the existence of the lake, which Beadnell believes to have still covered the lowest part of the Kharga depression during the early period of human occupation, the available supply of water would never have proved adequate for any extended settlement, without artificial development, and it is probable that even in early Egyptian times, and certain that during the Roman occupation, artesian wells were dug or bored, and the natural supply largely augmented.

Some of the older wells which are in use to-day, no doubt date back to the Roman period, and extensive tunnels and subterranean aqueducts still exist in the different oases, and are in many places still carrying water, which are also the work of the Roman engineers.

There are evidences in many parts of the several oases, of former springs, wells and cultivated areas, now covered by drift sand or dunes. This, of course, expresses but one side of the equation of possible climatic change, inasmuch as many of the fields and groves cultivated by the present inhabitants were no doubt undeveloped in ancient times.

The most cursory examination of the wells will, however, reveal the fact that the static pressure of the underground water has in general become less, and this is no doubt largely due to the haphazard and unscientific way in which bores have been located, without any reference to the mutual interference of wells.

The inhabitants of the villages are, as a rule, singularly apathetic and unenterprising as regards water exploration and development, and Ball instances a case in his report on the Kharga Oasis (p. 57)* in which the men of the village of Dakhakin were with difficulty induced to accompany the Survey party a few kilometers into the sand hills, where abundant water of good quality was found in several places.

This same lack of enterprise or energy is also shown by the way in which wells and cultivated areas are often allowed to drop out of use owing to a slight fall in the water level, which would seem to suggest the installation of a shaduf or saquia in order to place the water upon the land.

The use of these mechanical water-raising devices would also serve another useful purpose, in making possible the cultivation of the higher land, which is usually less impregnated with salt than the lower areas, to which cultivation has gradually been restricted owing to the steady decrease of water pressure in the wells.

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* Kharga Oasis: Its Topography and Geology. By John Ball. 116 pp. Maps, plans, ills. *Geol. Surv. Report*, Part II, Cairo, 1900.

The unit of volume used in the estimation and measurement of the flow of water from wells and springs, is the *qirat*. Official water measurement is carried out by local officials for taxing purposes, but the system in vogue is so faulty and inexact that the *qirat* may mean anything between 125 and 250 litres flow per minute, with a general over-estimation in the case of the smaller wells and under-estimation with the larger ones.

The water of both wells and springs is generally potable and fair in quality, but is occasionally rather strongly impregnated with iron and other minerals, and in some localities, as, for instance, in the northern part of the Dakhla Oasis, it issues at quite high temperature, one well which we tested in the town of Qasr Dakhl registering 37°C.

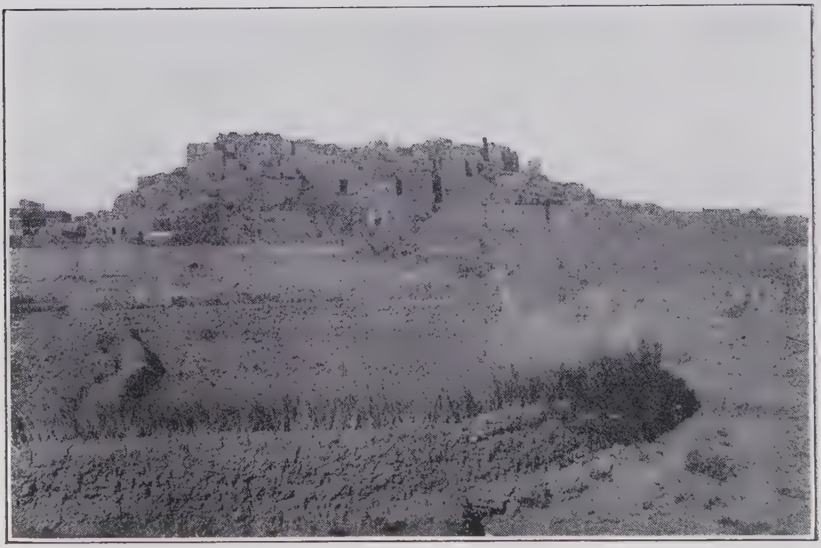

Fig. 3—The Village of Müt.

Paucity of water supply and encroachment of drifting sand are ever present problems for the dweller in the oases, and in addition to the upkeep of his wells, conduits, and ditches, he has been obliged at all times to undertake the construction and maintenance of walls, hedges, and barriers of various kinds, in order to preserve his precious fields and groves from destruction. The movement and behavior of drifting sand is one of the most pertinent problems in desert investigation, and the Libyan desert affords many striking examples of sand distribution.

The drifting sand throughout the region assumes in general the form of long ribbons or windrows of sand, with a general direction of N.N.W. to S.S.E. which coincides with the prevailing wind. Sometimes these ribbons have become broken up into lines of detached dunes, of characteristic crescentic form, but they are in general continuous, and often persist for scores, or, in some cases, for even hundreds of miles, with sharply demarked edges, and serrated crests. A peculiar feature of many of these sand belts is their arrangement in parallel lines only a short distance apart, thus leaving a sand-free strip of ground between them. Such a lane is termed by the Arabs "Sugag" or "passage," and is taken advantage of as much as possible in traversing sandy areas.

Of the desert surfaces in general in the Libyan region, the one which comes next to the sand in evil repute is that known as the Kharafish. This consists of wind-eroded limestone, with little or no sand or soil upon its surface. Its general character may be best imagined by supposing that a short choppy sea has become suddenly solidified. It is in general further diversified by wind-eroded rocks and hummocks of various sizes, and by patches of loose sand. A rather disconcerting feature about this rough type of country lies in the fact that in spite of the size and frequency of these rough, rocky hummocks, no shelter is to be obtained behind any of them. The country has been carved by the wind, and irregularities upon the surface have in general been chiseled down to lenticular shaped masses, with their axes placed along the direction of the prevailing wind-flow.

The best desert surface to travel over is that known to the Arab as "Serir," in which the rocky framework of the country is covered with a veneer of sand and rocky fragments:—soil it can scarcely be called, as humus is almost entirely absent. The existence of such a pavement probably depends primarily upon the character of the material forming the underlying rock. If this material tends to weather into spherical form it gradually becomes triturated into sand and dust and is removed by the wind; but if, on the other hand, it weathers into small lenticular or laminated particles, it forms an ideal wind-resisting material.

A portion of our route lay across a region in which the protective paving material was composed of countless thousands of fragments of wind-worn fossil shells, all of approximately the same size and shape—nearly circular and about an inch in diameter—which formed almost a mosaic over a layer of soft loamy soil.

Several well-known and long-used caravan routes traverse the Libyan desert, touching one or more of the oases. Of these routes the Darb el Arbain (the 40 day road) is by far the most important, having constituted the main line of communication between Equatorial Africa, Darfur and Egypt, for a very long period. Its starting point in Darfur is at the town of El Fasher, in Lat. 13°42′ N., Long. 25°20′ E.; and its termination at Assiut on the Nile in Lat. 27°10′ N., Long. 31°10′ E., and so this famous and much-dreaded road passes through nearly 12 degrees of latitude and 6 of longitude.

Entering the Kharga depression at its southern end, it passes in succession the villages of Beris, Bulaq, Gennah, and Kharga, and leaves the basin at its extreme northeastern angle. The crossing of the high plateau between this point and Assiut has always been deemed the most arduous part of the entire journey, for caravans. The surface is very bad; rough "kharafish" surface alternating with loose sand; and the distance between the last available water under the basin rim and the water in the Nile Valley near Assiut is nearly 150 kilometers. Cailliaud, writing in the second decade of the nineteenth century, describes a single caravan which arrived in Assiut over the Darb el Arbain, and contained over 16,000 members, including a large number of slaves;—and remarks upon the wretched condition of both human beings and beasts.

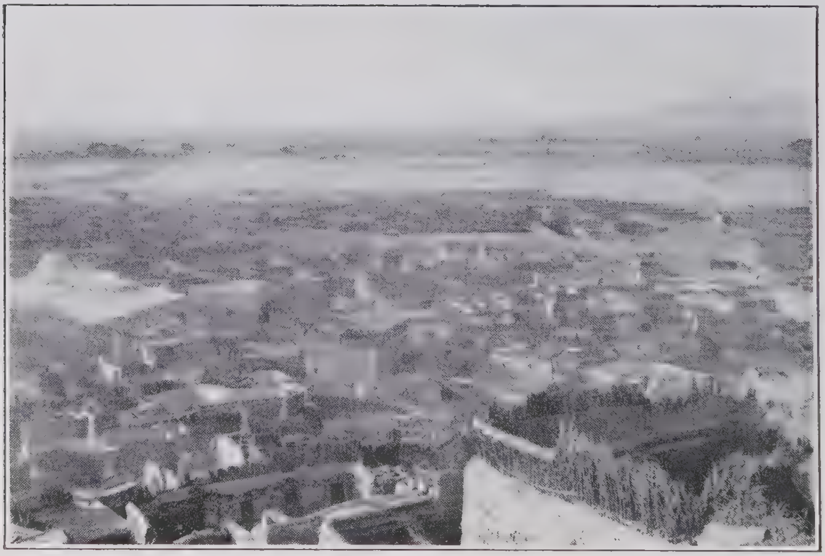

FIG. 4—Panorama from housetops, Müt.

Of other routes, the Darb el Tawil, which leaves the Oasis of Dakhla at its north-east corner and runs to Beni-Adi and Manfalut, in the Nile valley, is perhaps the best known. The Darb el Gubari is one of the main routes between Kharga and Dakhla, and the Darb el Sugag is the most practicable route between Dakhla and Farafra. Several other lines of communication have been in use since very early times, between the various oases and the Nile valley.

The word "oasis," which primarily means an abiding or resting place, is perhaps somewhat of a misnomer as applied to the extensive regions in the Libyan desert, which are generally so termed. The connection, however, lies in the fact that the areas in question are excavated or depressed to a sufficient depth below the general desert level to render the underground water locally accessible, and so make human habitation possible. So formidable, however, are the obstacles to travel and exploration in the Libyan regions in general, that although the oases themselves have been known and inhabited for so long a period, our knowledge of their limits is still far from complete.

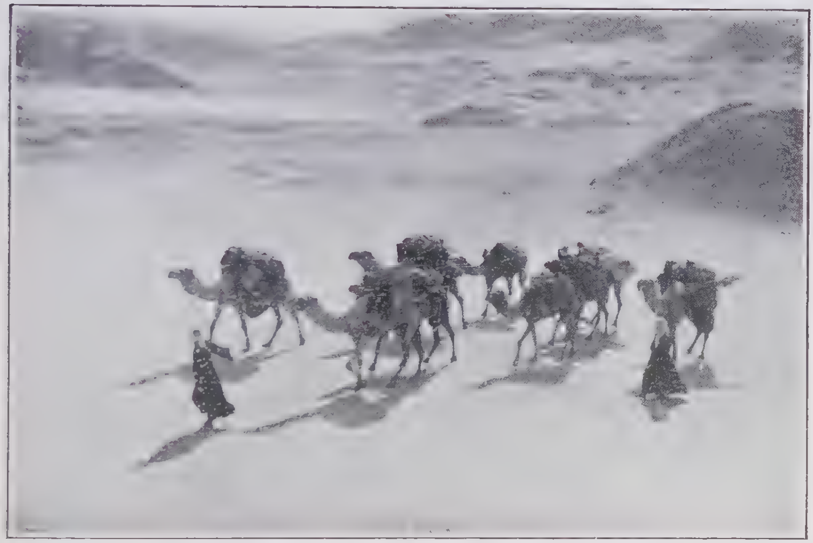

Fig. 5—Ascending the Dakhla rim.

The two inhabited districts of Kharga and Dakhla, which together constitute what is known as the Great Oasis, both lie below the same line of escarpment, although they are fully 120 kilometers apart, and separated by rough and barren country. The oasis of Farafra is bounded to the west and north-west by a bold and well-defined rim, but our knowledge of its other limits is still scanty.

Baharia is a large pit-like depression with a practically unbroken wall or escarpment all around it. It has been commonly referred to as the "Lesser Oasis."

These four, together with the Oasis of Siwa, which is now most commonly and conveniently reached from the end of the Coast-line Railroad which runs west from Alexandria, constitute the most important habitable areas of this immense arid region. One more, the almost unknown Oasis of Kufra, lies far to the west, and is in reality tributary to Tripoli.

The easiest method of reaching the Great Oasis at the present time is by means of a narrow-gauge railroad which starts from the small village of El Qara, situated at the edge of cultivation in the Nile Valley, in Lat. 26°05′ N., Long. 32°03′ E.

The builders of the railroad have taken advantage of a long easy slope which breaks the line of the Libyan escarpment just west of this point, and have then carried the road directly across the plateau towards Kharga, reaching the edge of the depression at a distance of about 150 kilometers from El Qara. This was the route which we followed on our journey to the oases, and arrangements having already been made with the Corporation of Western Egypt, whose headquarters are at Kharga, for men, camels and camp equipment for the desert trip, we were enabled to start without delay.

In addition to ourselves, our party comprised Abu-Salem, our head camel man, and seven other men of various races, ages and degrees of desirability. Our camels were twelve in number—three riding animals, and the rest to carry baggage, water and feed. As we were thoroughly accustomed to desert travel and anxious to keep our outfit as light and portable as possible, we were unwilling to burden our camels with the tents, camp furniture, and many other conveniences pressed upon us by our Kharga friends, and we had no cause during our journey to regret our decision.

The absence of any dragoman or interpreter with our party had also been looked upon as a possible source of trouble and discomfort, as we talked no Arabic, and our men no English, but this difficulty was smoothed away by means of a small Arabic dictionary and our general knowledge of dealing with the outdoor man. Our route was to be first to Kharga Village, thence along the Darb el Gubari to the Oasis of Dakhla and its various villages, then by means of the Darb el Sugag to the little visited Oasis of Farafra, and from thence to

Baharia; returning to the Nile Valley at or about Minia, approximately along the route followed by Capt. Lyons in 1894, on his return journey from the Baharia Oasis.

El Kharga, which is the principal town of the Kharga Oasis, is a rather uninteresting mud-built town, with a population of something over 4,000. There are two small mosques with mud minarets standing out from the general level of the other buildings. The houses are irregular and in general small, and the streets are extremely crooked, narrow, and for the most part covered over either by the upper stories of the houses, or by earth roofs, so as to resemble tortuous tunnels.

The sand has encroached somewhat upon the east side of the town, and most of the cultivated fields and palm groves lie to the west. A number of wells furnish the water necessary for cultivation and for the domestic needs of the villagers.

A short distance north of Kharga is situated the Temple of Hibis, which was built by the Persian kings some 400 or 500 years before the Christian era, and is still in a very fair state of preservation. Several other interesting archæological remains are also to be found in the vicinity, most of which have frequently been described.

Our final watering, before entering upon the Darb El Gubari, was at Bir Mansura, which is a good well some four kilometers north of Kharga. The word Bir means a new well, or rather it is used to designate a well which has been sunk within the actual knowledge of the living generation. For ancient well the term used is Ain. Bir Mansura, therefore, signifies that the well of Mansura has been bored in modern times, and as a matter of fact it was still unfinished in 1898, when the Government Survey party was in the oasis.

Soon after our swing towards the West from Bir Mansura, a belt of soft sand was crossed, a few kilometers in width, and we then entered upon a long succession of open flats, with intervening stretches of low, broken hills and isolated buttes, which lasted until we were well within the confines of the Dakhla Oasis.

The long line of escarpment could sometimes be seen far to the north, and long clear vistas towards the south and southwest could also sometimes be obtained. The country was almost wholly devoid of life, either animal or vegetable, and in fact we traveled for a distance of nearly sixty kilometers without seeing a single plant of any description. The wind-eroded buttes and mounds, the sculptured surfaces of rock and soil, and the occasional sand dune or patch of wind-drifted sand, all bore testimony to the potency of the wind in forming the topography of this desolate land.

Upon the fourth day out from Bir Mansura, our route turned towards the north, and a small well, with two stunted acacia trees growing close beside it, was soon reached. Other evidences of human occupation followed, and we soon saw one of the groups of tombs belonging to the village of Tenida.

The zone of the dead is, in general, the first sign that one is approaching a village, and oftentimes the more pretentious tombs are built in commanding positions and can be seen for long distances. Graves are sometimes surrounded by low walls of sun-dried mud, which are ornamented by inserted fragments of stone and colored with whitewash or red ochre.

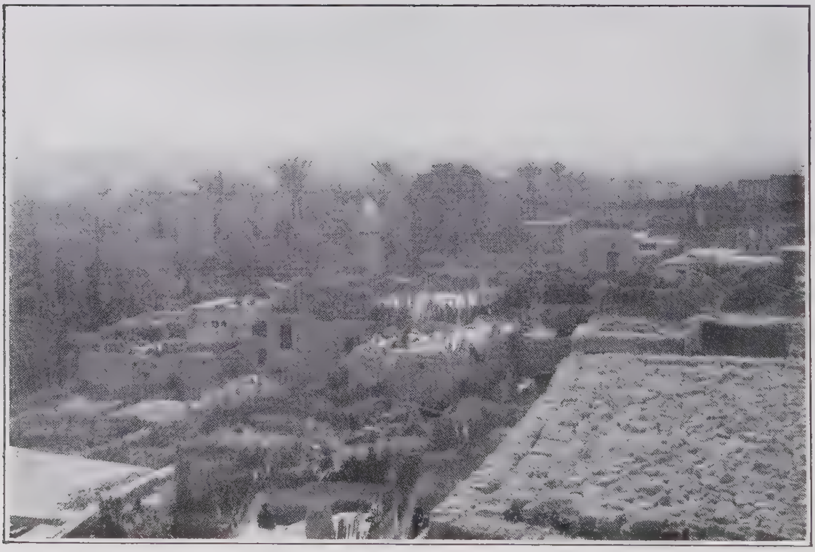

Fig. 6—Rashida from a housetop.

The village of Tenida is situated, as are most of the other oasis villages, upon and surrounding a small hill. It is the most easterly of the Dakhla group of settlements, and has, no doubt, at all times been liable to raids from marauding parties of the desert nomads. It is surrounded by a wall, which is pierced by openings, fitted with large heavy gates. Hoskins, who visited the place in 1837, reports that it was at that time deserted, owing to its unprotected state, and distance from the other villages. There are two wells within the walls, and a number among the surrounding fields and groves, but the region as a whole does not look prosperous or fertile. We stayed for half a day at Tenida, watering and resting our camels and attempting unsuccessfully to obtain eggs, poultry, or fresh meat for ourselves and our men.

Upon leaving Tenida, our next objective point was the town of Müt, which is the administrative headquarters of the Oasis of Dakhla. The distance from Tenida to Müt is about 38 kilometers, and the road connecting the two places passes the two small villages of Smint and Masara, with their small patches of cultivated land.

The town of Müt contains some 1,500 inhabitants and is built in the usual manner, upon a small rough hill. It is surrounded by a rather badly built mud wall, which we were told had been constructed by forced labor, under the direction of the Mudir, during the time of the Dervish raids. As a protective measure, however, it would not rank very high. There are two very good wells within the town, and at one of these a saquia is steadily at work raising water. This is rather an unusual feature in one of these desert villages, and indicates a larger amount of energy and enterprise than is common.

About 2 kilometers to the southwest of Müt are the large and most interesting ruins of what has once been a walled town. The place is evidently very ancient, and the unmistakable brick walls and foundations of the Roman architects come very far up in the series of remains which have gradually accumulated.

A large pit-like depression occupies the center area of the ruins, and a tunnel has been driven from this to the lower ground outside the walls. A stele which was brought from this ruin by Capt. Lyons recorded the very complete details of a long lawsuit over a water-right under one of the Egyptian dynasties, and a full examination and excavation of the place would no doubt reveal many interesting facts concerning the earlier occupancy of the oasis. The cultivated fields extend for only a few kilometers to the west of Müt, and then the sand begins. It looks very forbidding and impossible, and but little is known as to its distribution or extent. Several attempts have been made to penetrate this region, but with little success.

Capt. Lyons passed along the eastern edge of the dunes on his journey from Müt towards Selima in 1893-94, but this route gradually bears away from the sand, and so he was unable to observe its southerly extension. Mr. W. J. Harding King has recently traveled for a considerable distance towards the southwest, however, and reports the country in that direction as more easy of access than had been anticipated.*

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* *Geog. Jour.* Vol. 39, 1912, No. 2, pp. 133-137.

We stayed for nearly two days at Müt, and then began the long northward leg of our journey. Our first stop was at Rashida, and we found this to be by far the most attractive and prosperous-looking of all the villages we saw. It stands, as is common, upon a hill, and is surrounded by very fertile looking palm groves and walled gardens, in which oranges, lemons, bananas and other fruit abound. The village itself contains two small flour-mills, worked by oxen; a mosque, a school, and a number of neat-looking houses. We were taken to the flat roof of one of these houses by a head-man of the place and got a splendid bird's-eye view of the groves, wells and cultivated land.

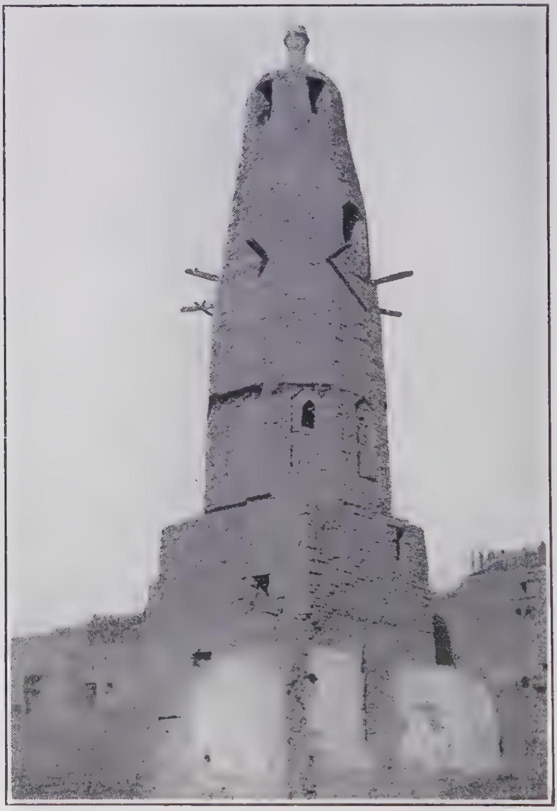

Fig. 7—Mosque minaret at Qasr Dakhl.

The next village we passed was Budkulu, which seemed to be a perfect antithesis to Rashida, dirty, squalid and poverty stricken. A few hours more brought us to Qasr Dakhl, which is the largest and most interesting town in the Dakhla basin. It lies almost at the foot of the northern rim, and is surrounded in the usual manner by a strong and formidable-looking wall, which is pierced by several gateways. The streets of the place are almost as dark and devious as are those of Kharga, and are skillfully protected in many places by heavy doors or gates, and commanded at other points by loopholes in the upper walls of the houses. A marauding enemy would have a particularly strenuous time of it in Qasr Dakhl if the fighting ability of the inhabitants is at all commensurate with their proficiency in military engineering. The town contains between 3,000 and 4,000 people, three good-sized mosques with prominent minarets, and two good wells. We were escorted about the place by some of the head men, and shown several of the leading local industries,—mat making, flour milling and shoe and pottery making. Of these several activities the pottery manufacture is the most important, a very good quality of clay being found in the vicinity. The potter's shed, in the establishment we inspected, contained six wheels, and the quality of the output was excellent. Several kilns were in use for the burning, and bundles of dried casuarina* were used as fuel.

The Darb el Sugag, which we were to follow from Qasr Dakhl to Farafra, climbs the escarpment within a few miles, and the outlook as one approaches the foot of this formidable barrier with a train of heavily loaded camels, is not at all encouraging. The caravan route winds in among rough hills and terraces, and the height of the wall ahead seems steadily to increase. At last the way to the top becomes visible,—a long slope of wind-drifted sand which spreads down fanwise from the mouth of a gorge far above. The camels are obliged to tack up this sand slope in long, sinuous curves, and many and weird are the words of encouragement or vituperation hurled at them by their puffing drivers.

At last, however, the top is gained, and a look back over the immense oasis almost repays one for the climb. The rim through which the way has just been won, stretches away in mysterious lines east and west, and the basin itself is only limited by the blue of the infinite toward the south. Here and there one can see the faint dabs of green-grey which mean palm groves, the grey-brown knobs which mean villages, the yellowish-brown patches of the cultivated lands, or the white speck of a tomb. But in the main the picture is just one of the desert itself, with its sands and sun-browned rocks; and one realizes how slight a mark man has yet been able to make upon this arid land in spite of his 4,000 years of effort. The escarpment is about 300 meters in height, and having gained the top we found ourselves among the roughest description of kharafish surface, with intervening pockets and patches of loose sand.

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*So called from the modern Latin name of the casowary, its branches bearing a resemblance to the feathers of that bird.

To add to our discomfort the weather was becoming very bad, a cold wind from the N.N.W. was gradually increasing in force until it attained the velocity of a gale, and the drifting and almost blinding sand was cutting our faces even as we sat upon our camels. At last our guide gave it up and confessed himself beaten, and so we put down our camels in the most sheltered spot we could find amid the howling desolation, and made our camp. The succeeding night was the most unpleasant one we experienced while in the desert. The temperature became quite low before morning (21°F.), and the wind never ceased.

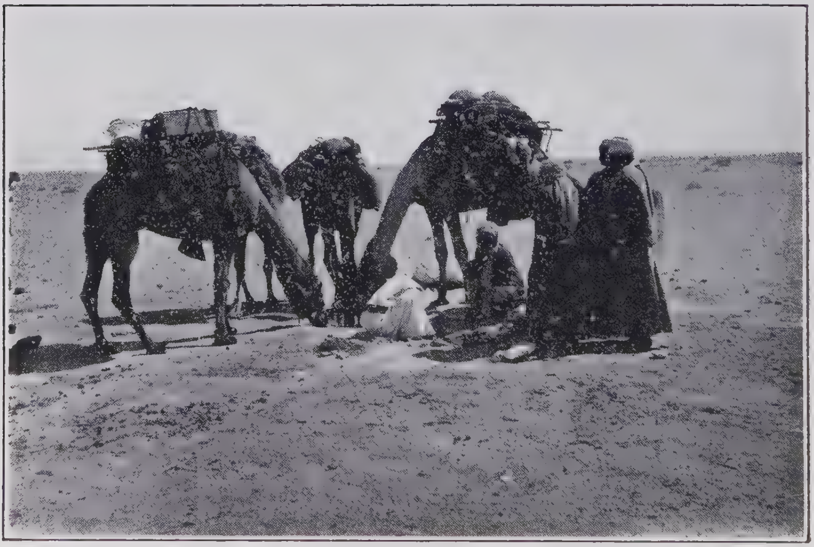

Fig. 8—Camels drinking at Bir Dikker.

It was very bad and uncomfortable for the camel boys with their scanty clothing and covering. They lay huddled together in such shelter as they could find, under the lee of their camels, and followed the desert dweller's universal practice of wrapping the major part of their covering about their heads.

Soon after our start in the morning Abu Salem found what he had been looking for the evening before:—the entrance to one of the "sugags," or passages, between the sand hills, to which reference has been made above. Travel along these sugags is wonderfully easy.

The surface of the ground is soft and even, and the large padded feet of the camel give one the sensation of riding over firm, springy turf.

Occasional small patches of sand are met with, but the ground is for the most part clear .

Having once entered the sugags, we passed through them with only one intermission in crossing a sand field, until the south end of the Oasis of Farafra was reached, at Bir Dikker. We made the very interesting discovery of numerous fragments of ostrich egg-shell among the sand of the dunes. The ostrich can not have inhabited this region for a long time, but the egg-shell seems to be fairly common. Bir Dikker is a typical desert well, and when we arrived there it was carefully covered over with a flat stone and the joints round the edges were sealed with mud. A small basin close at hand, which has been scooped out in the sand and lined and puddled with mud, is used to water camels. A clump of stunted palms, together with the converging desert trails, serves to indicate the position of the well. The water is fair but not very plentiful.

The Oasis of Farafra, in which we had now arrived, is the least known of any of the Inner Oases. It has been visited by but few Europeans, and is markedly different from the other oases, in the character of its inhabitants. The town of Farafra is located, as usual, on a small hill, but its main feature is a large, fort-like community house which occupies the larger part of the place. The inhabitants are grave, dignified and courteous, but quite unapproachable, and very different in manner from the people of the other towns we visited. They belong chiefly to the strict Senussi sect of Mohammedans, and there is a Senussi monastery a little distance outside the village walls.

A site for our camp was allotted to us in an open sandy space between the village and its well, and most of the population came and squatted down in a respectful and attentive row to watch proceedings. Their curiosity once satisfied, however, they left us pretty well alone, and about all we saw of them afterwards was the dim and shadowy silhouette of the women, as they made their early morning trips across the sand to the well for the day's supply of water.

Our first call upon arriving at the village had, of course, been upon the local Omdeh and we were received in a low, dark chamber, around the walls of which were arranged a number of guns, ancient in pattern but evidently still in service. We sat upon the mats with several of the local sheikhs and were regaled with coffee and some wonderful dates, but although Abu Salem made gallant effort to keep up conversation with his only two English words, "Very good," and repeated them with an affirmative, declamatory or interrogative inflexion, again and again, and we used our scant score of Arabic words in the same comprehensive fashion, the conversation soon languished and the interview terminated. We stayed at Farafra two days, but were never invited to inspect either town or gardens, and so saw rather less of this most interesting place than we could have wished.

The village watering-place is a large "ain," half a mile to the south. It is a pool or pond some 75 feet in diameter, and the bubbling up of gas from the well can be seen about in the center. The water is used in all the different ways which the needs of the inhabitants suggest—for drinking, stock watering, laundry purposes, bathing, soaking goat skins, and sky-larking of the children, and then the small residue is used for irrigation. Several of these operations are carried on in the pool itself, and so the general sanitary condition of the water may be imagined, but not described. A small clam-like bivalve lives in large numbers in the warmish water, and dies, or is thrown out upon the bank to add to the general odor. As this well was the only possible source of supply for our use between Farafra and Baharia, we dosed our water rather liberally with potassium permanganate.

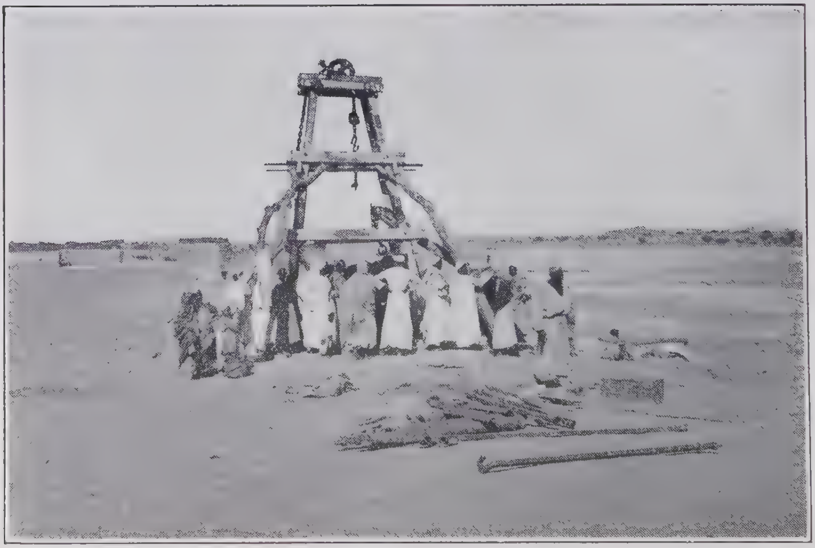

FIG. 9—Well boring at Farafra.

The caravan road, after leaving Farafra village, crosses the floor of the basin for nearly forty kilometers, to a small well known as

Wadi Abu Hessn, where a small quantity of rather indifferent water may be obtained. The country about this well is very typical of the region—thousands of small wind-eroded chalk mounds, from the size of a barrel to that of a house, sometimes hemispherical, but frequently looking somewhat like an inverted bottle. Sir Archibald Edmonstone, writing in 1822, quotes Belzoni to the effect that hillocks of this type, which are very common near the Baharia Oasis, are doubtless the tombs of the army of Cambyses!; the tradition being that Cambyses, who was one of the Persian rulers of Egypt, in the XXVIIth dynasty, sent an army of 50,000 men to subdue the Oasis of Jupiter Ammon, and that they were lost in the desert and never heard of again.

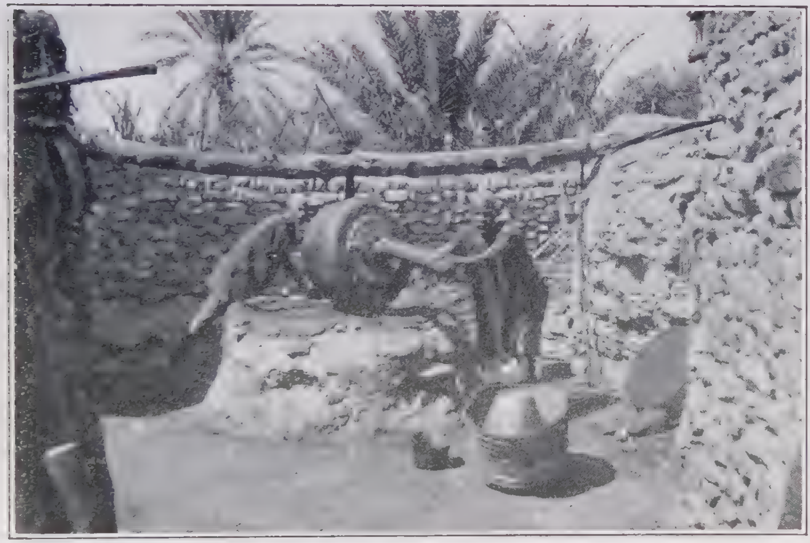

FIG. 10—Olive-oil mill at Bawitte.

We entered the Oasis of Baharia at its extreme southwest angle, and had a splendid view of the basin from the edge of the rim. This rim is comparable in height and steepness with the one up which we climbed after leaving Dakhla, and its ascent must be nearly as difficult for camel trains traveling south. The floor of the oasis, as seen from above, looks nearly level and unobstructed for several miles, with small hills and ridges showing up further on. A few stunted trees or bushes can also be seen here and there. The first signs of human habitation which we saw in the basin were at Ain El Heuss, which is a small, wall-protected settlement, with a few palms, and patches of cultivated ground around it.

There are some very striking examples hereabouts, of the subterranean aqueducts of the Romans. The outward and visible signs of one of these aqueducts will be a line of small irregularities upon the surface of the ground, some twenty or thirty yards apart. These are the traces of the manholes, or spoil-shafts, which the tunnel drivers sunk and utilized for sending up the debris from the headings.

Often the tunnels are now in disuse, and the manhole shafts full of drifted sand, but here and there a line of openings will be seen which have been kept clear of sand by the people of to-day, and upon looking down there one can see the tiny stream of water at the bottom, which the Roman engineers worked so hard to gain. Some of the tunnels are several kilometers in length and in some places the heading is at least 100 feet underground. Beadnell has given a graphic description in "An Egyptian Oasis" of an exploration of one of these remarkable aqueducts.*

The chief settlements in the Baharia basin are the two dual towns of Qasr Baharia-Bawitte and Zubbo-Mandisha. These are all situated near the northern end of the depression, where the water is most abundant. Bawitte was our objective point and was reached the next day after passing El Heuss. We were first made aware of our nearness to the settlement by the sight of a party of grave-robbers at work and a closer acquaintanceship with local conditions revealed the fact that this was indeed one of the major local industries.

The towns of Bawitte-Qasr Dakhl are pretty well surrounded by vast burying-grounds and necropoli, in which the accumulated bones of the last 4,000 years have been laid away, and the gentle Baharian digs open and pilfers these graves of such poor little trinkets of personal adornment as he can find, throwing out odd fragments of humanity with the greatest carelessness. So much so, that the refuse heaps around the doors of many of the village houses, and over which the village children play, are full of such bones and morsels of human clay. The profession seems to be an open one—quite free and untrammeled by any regulations, local or otherwise—but Bawitte would be much more attractive if they would at least clear up the bones.

The conditions of water supply are entirely different here from those in the other oases we visited, inasmuch as the larger part comes from natural springs and outlets and flows in part through natural water courses after reaching the surface. A zone of water bearing strata crops out upon each side of the twin towns—north and south—and the palm groves along the northern side are both good and abundant.

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* An Egyptian Oasis, H. J. Llewellyn Beadnell, London, 1909, page 179, *et seq*.

Bawitte supports an intermittent sort of outdoor bazaar, in a large open space near the mosque. Our needs were confined to sheep, turkeys, bread and fruit, all of which we obtained of excellent quality.

The drifting sand is encroaching very seriously upon some of the palm groves to the north and northwest of Qasr Baharia, and also bids fair to choke some of the wells in this locality, but on the whole the district is fairly free from sand, and in spite of the general untidiness and air of desolation due to the operations of the grave-robbers in so many directions, it looks prosperous and fertile. We were shown through some very well cultivated gardens, and also inspected some establishments for expressing and preparing olive-oil, manufacturing camel-saddles, and making mats. There are numerous early Egyptian and Roman remains hereabouts, in addition to the extensive regions of tombs, and it appears probable that to the Romans at least it was a very important place.

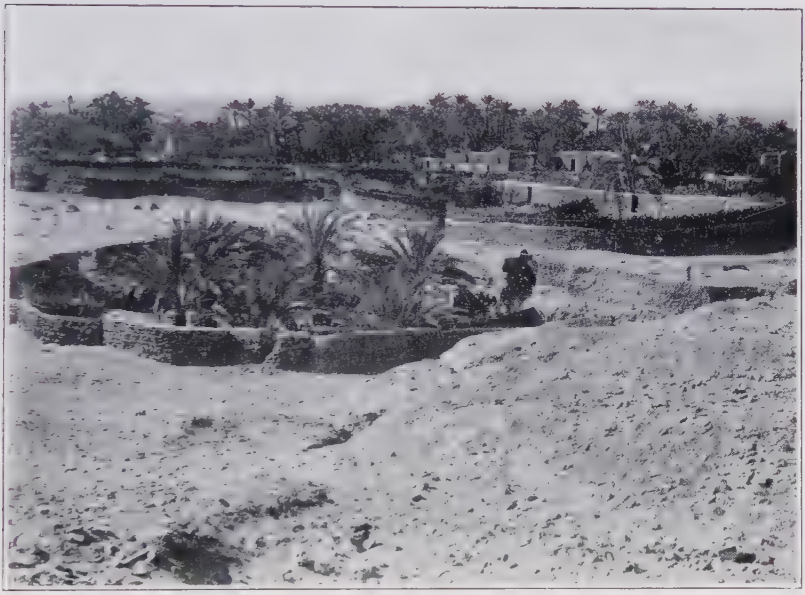

FIG. 11—Walled gardens at Bawitte, showing human bones from rifled graves.
Photo by D. T. MacDougal.

Upon our departure from our camp near Bawitte, we passed near to the villages of Zubbo and Mandisha, but did not visit them. Our last halt in the basin was at the little spring of Ain Gelid, which lies near to the foot of the wall at the N. E. end of the basin.

Several of the caravan routes between Baharia and various terminal points in the Nile Valley leave the basin near this point, and Ain Gelid is the usual last watering-place touched at before crossing the desert by these various roads. The ascent of the rim is in this case comparatively easy, being up a long, loamy slope. Once on top, however, the usual kharafish is encountered for several miles, but the surface soon improves again and is fairly good until the remarkable line of sand hills known as the Abu Moharik is approached. A stretch of kharafish is crossed near to the western edge of the sand, which is chiseled out of a particularly hard limestone. The upstanding edges and points upon the surface are very acute, and the driving sand has polished it all, until it looks and glistens in the sunshine like a surface of rough ice.

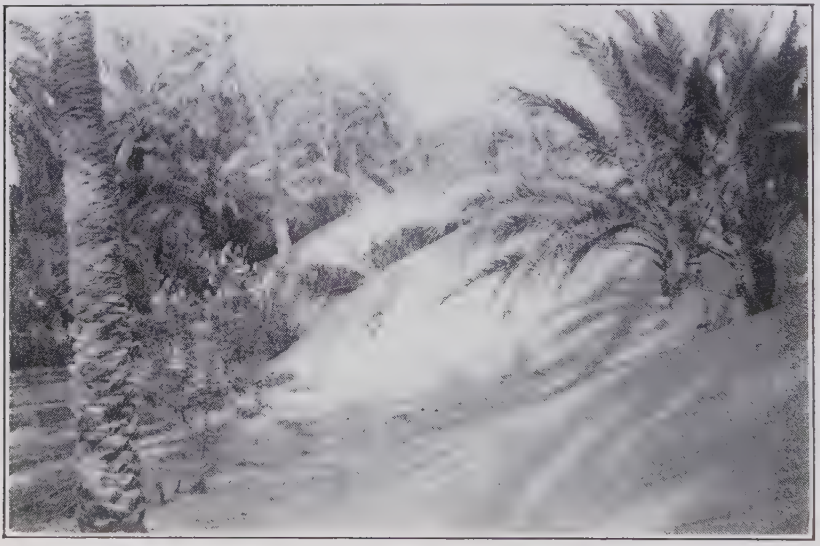

Fig. 12—Sand encroachment at Qasr Baharia.

The Abu Moharik hills are one of the most noteworthy of the Libyan sand ribbons as far as is yet known. They have never yet been traced over the desert from end to end, but different explorers and observers have crossed them at various points, and so their main features are known. The belt is reported as starting somewhere near the tiny Oasis of Moghara, in Lat. 30°12′ N., Long. 29°0′ E., and persisting in a practically unbroken line down to the extreme southern end of the Kharga Oasis in Lat. 24° or thereabouts. Its further possible extension towards the south is as yet unknown, but the distance between the two above mentioned points is approximately 700 kilometers. This was in reality the same line of sand we crossed soon after leaving Kharga. The average width of this sand belt is probably not over 5 kilometers.

The crossing of Abu Moharik was the only serious obstacle we encountered on our journey between Baharia and the Nile, most of the surface beyond it being of the "serir" type—deadly monotonous, but easy and pleasant to travel over. The only incident worthy of note which we encountered by the way was a glimpse at the operation of salt mining, as carried on by a party of Nile Valley men. The salt seems to occur in the form of large irregular masses of crystals, distributed unevenly throughout the ground. These masses they search for and dig out when found. An area of some thousands of acres has been exploited in this manner, and somewhat resembles a prairie-dog town.

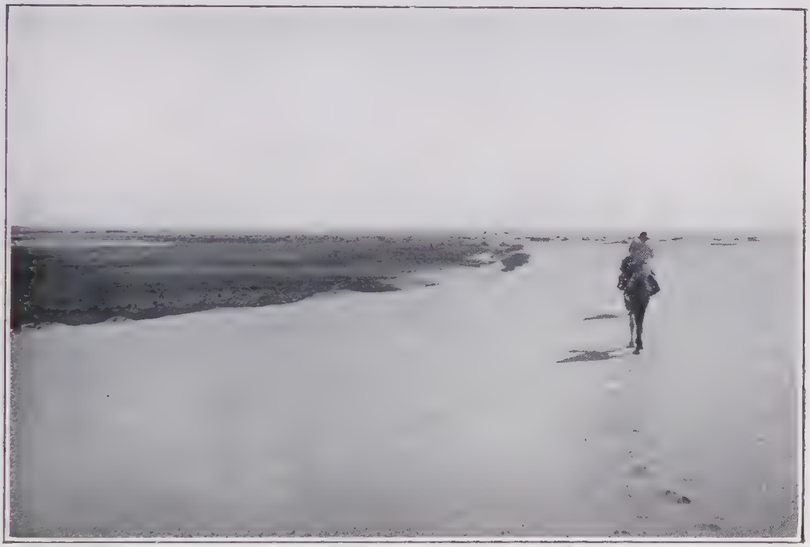

FIG. 13—Dividing line between the desert and fertile ground; Nile valley, west of Minia.

The spirits of our camel boys had been steadily rising, as the Nile Valley, and the end of the journey, were approached, and singing, horse-play, and skylarking were very much in order. At last, from the shoulder of a small hill we saw it—the narrow grey-green line in the far distance, which represented the entire width, although but a small portion of the length, of the wealth of Egypt. It does not look very imposing as viewed from the hinterland of the desert, and the line of division, when one reaches it, between desert and vegetation, is as clear-cut as though made with a knife. We realized more keenly than before how formidable the desert must have seemed to the first men who essayed to cut loose from the fields and flesh-pots of Egypt, to cross it and discover its secrets.

Our "land-fall" was made near the village of Samalut and we then had to turn up the valley some twenty-five kilometers, to reach the town of Minia, which was to be the end of our camel journey. Our last camp was made just outside the wall of some nameless little Nile village, dirty, unsanitary and uninviting, and disturbed by the barking of seemingly countless thousands of dogs.

There are few roads worthy of the name among the fields of the valley. Land is too valuable to be used for such a purpose as road building. Communication is therefore perforce restricted to the tops of the dikes and canal banks, and the desert-bred camel sees many strange and fearsome sights upon either hand to upset his nerves and temper, as he walks upon the tops of these ridges.

Our animals, however, were encouraged, guided and exhorted along until at last Minia was reached and the journey ended. We had spent twenty-four days in the desert between Khargah and Minia, and had covered a distance of something more than 800 kilometers. We had fortunately experienced no serious mishap, and but slight discomfort, and our relations with our canal men (and camels) had been of the best.

It had interested us to note the points of difference between this new type of desert man and the Southwestern Indian, with whom we were familiar. The Bedouin, as we observed him, has a distinctly larger angle of possible directional error than has the Indian, or, in other words, his sense of direction is not so keen. He may vary, in either estimation or actual travel, some 5 to 10 degrees upon either side of a true course. His method of steering seems to be largely observational. He goes simply from one known point to another and of course, is also able to steer to some extent by the stars.

We found that he quickly learned and understood the kind of ground map which one so often uses in geographical conferences with Indians. He would, however, let pass without correction intentional errors in orientation or direction of given points, in a way few Indians would have done. We acquired much useful local topographical information, nevertheless, in this way.

Concerning the general results of our journey and observations, from a scientific point of view, it is as yet a little early to speak, but we at least obtained some extremely valuable comparisons between the Libyan desert and other arid regions with which we are familiar, as well as a most interesting insight into some of the conditions which are peculiar to this region alone.

STUDIES ON CLIMATE AND CROPS

4. CORN CROPS IN THE UNITED STATES

BY

HENRYK ARCTOWSKI

The following figures, expressing in bushels the corn crop for the year 1906,* show plainly how much more important the culture of maize is in the United States than in any other country:

United States	2,927,416,000
Europe	609,614,000
South America	198,988,000
Africa	37,889,000
Australia	8,608,000

It is difficult to realize the quantity of grain 2,927,416,000 bushels represents.

C. P. Hartley writes† that: "If the corn crop of the United States for 1906 had been placed in wagons, fifty bushels per load, and allowing twenty feet of space for each wagon and team, the train of corn would have reached nine times around the world at the equator."

A verification of this statement, prompted by curiosity, gave me 8.8 times around the equator.

Another quotation and we will have an idea of the commercial value of the maize crop harvested in the United States. The Hon. James Wilson, Secretary of Agriculture, in his report for 1909 says:

> "The most striking fact in the world's agriculture is the value of the corn crop of 1909 in this country. It is about $1,720,000,000. It nearly equals the value of the clothing and personal adornment of 76,000,000 people, according to the census of 1910. The gold and silver coin and bullion of the United States are not of greater value. This corn came up from the soil and out from the air in 120 days—$14,000,000 a day for one crop, nearly enough for two Dreadnoughts daily, for peace or war."‡

The following diagram (Fig. 1) shows the average yield of corn per acre for the years 1891 to 1909. We see that in 1901 there were only 16.7 bushels per acre harvested, while in 1906 there were 30.3. To make it plainer, I transcribe the figures of corn production for these years. They are: 1906, 2,927,416,091; 1901, 1,522,519,891. The difference, 1,404,896,200, nearly equals the entire crop of 1901. This difference gives a good idea of the range of variations occurring.

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* Yearbook of the Department of Agriculture for 1908, p. 597. Washington, 1909.

† Cyclopedia of American Agriculture, Edited by L. H. Baily. v. 2, p. 403. New York, 1907.

‡ Annual Report of the Dept. of Agric. for the year ended June 30, 1909. p. 10. Washington, 1910.

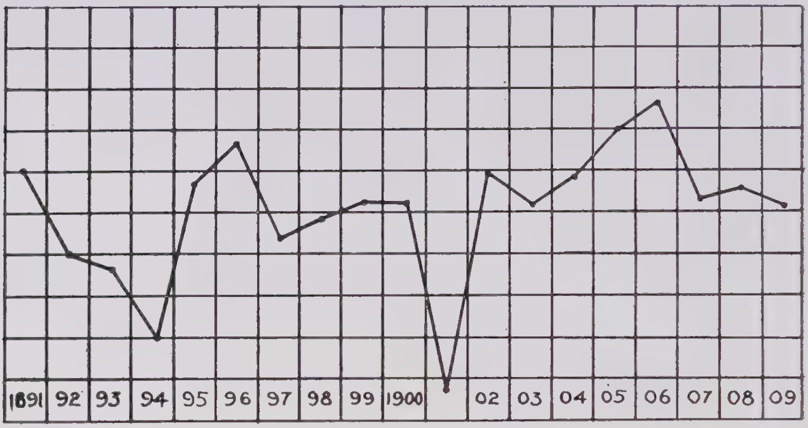

FIG. 1.

It is in the "corn belt" comprising the States of Iowa, Ohio, Indiana, Illinois and portions of Missouri, Kansas and Nebraska that the cultivation of maize is concentrated. Texas and Oklahoma, however, produce also great quantities of corn. In 1908 the corn acreage was as follows:

Illinois, 9,450,000; Iowa, 9,068,000; Texas, 7,854,000; Missouri, 7,542,000; Nebraska, 7,621,000; Kansas, 7,100,000.

More than a million acres were also given to maize culture in each of the following states: Pennsylvania, Virginia, North and South Carolina, Georgia, Ohio, Indiana, Michigan, Wisconsin, Minnesota, South Dakota, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Oklahoma and Arkansas.*

One of the maps of the Census Atlas gives the distribution of corn production for 1900.† Notwithstanding the fact that this map expresses the distribution of the amounts of crop for one particular year,—and may therefore differ materially from one which could be drawn by using averages of a certain number of years,—it is still very interesting to compare it with the rainfall map.‡

This comparison suggests a search for the connections which may exist between the corn crops and the variations of rainfall. Moreover, in a paper published in 1903, J. W. Smith* has shown that the corn crops depend very greatly on the rainfall of the months of June and July. The production of corn in the United States depends, therefore, entirely on the variations of rainfall in the "corn belt," or the central portion of North America.

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* Agricultural Statistics, 1908. *Yearbook of Agric. 1908, p. 599.*

† *Statistical Atlas of the United States 1900. Plate No. 154.*

‡ *U. S. Geol. Surv. Water Supply Paper 234. 1909.*

In this paper I shall study geographically the corn crop statistics for the years 1891 to 1909. The figures in Tables 1 and 2, which follow have been calculated from the data given in a paper of Charles C. Clark† and the Yearbooks of the Department of Agriculture.

TABLE I. 1891–1900.

	MEAN	*1891*	*1892*	*1893*	*1894*	*1895*	*1896*	*1897*	*1898*	*1899*	*1900*
	Bush. p. acre:										
Maine	37.1	+0.4	—1.6	—6.8	+2.8	+4.9	—0.1	—0.1	+2.9	—1.1	—1.1
New Hampshire	37.3	—1.5	+0.5	—5.6	—3.0	+2.9	+4.7	—3.3	+3.7	+1.7	—0.3
Vermont	38.9	—1.7	—0.9	—6.5	+1.9	+6.7	+2.1	—3.9	+4.1	—2.9	+1.1
Massachusetts	38.0	+1.5	+0.7	—4.5	—3.5	+5.9	+5.0	—5.5	+2.0	—2.0	0.
Rhode Island	31.7	+2.8	+1.7	—7.3	—0.3	—0.8	+2.3	—0.7	+2.3	—0.7	+0.3
Connecticut	35.1	+0.9	—0.6	—6.9	—4.1	+2.8	+2.9	—3.6	+1.9	+3.9	+2.9
New York	31.9	—0.1	+1.1	—2.4	—3.7	+3.7	+2.1	—0.9	+1.1	—0.9	+0.1
New Jersey	33.1	+1.1	—1.5	—7.2	0.	—0.1	—0.1	—1.6	+3.9	+5.9	—0.1
Pennsylvania	32.4	+0.9	—1.9	—7.9	—0.4	+1.1	+7.6	+3.6	+4.6	—0.4	—7.4
Delaware	23.0	—1.0	—4.3	+1.6	—1.0	—2.0	—1.0	+6.0	+2.0	—1.0	+1.0
Maryland	27.4	—1.9	—6.8	—3.2	—4.5	—0.6	+4.6	+5.6	+3.6	+4.6	—1.4
Virginia	18.9	+0.8	—3.6	0.	+0.2	—0.3	+2.6	—0.9	+3.1	+1.1	—2.9
West Virginia	25.1	+2.2	—2.6	—3.4	—6.6	—0.9	+4.9	—0.6	+3.9	+0.9	+1.9
North Carolina	12.8	+1.3	—2.6	—0.5	+0.6	+1.7	—0.8	+0.2	+1.2	+0.2	—0.8
South Carolina	9.8	+2.0	+0.9	—1.9	+1.6	+1.5	—0.6	—0.6	+0.4	—0.6	—2.6
Georgia	11.0	+1.2	+0.2	+0.1	+0.7	+2.0	0.	0.	—2.0	—1.0	—1.0
Florida	9.6	+1.4	—0.6	+0.1	+0.5	+1.6	+0.4	—1.6	—0.6	+0.4	—1.6
Ohio	32.7	—0.7	—3.3	—8.9	—6.4	—0.1	+8.3	—0.2	+4.3	+3.3	+4.3
Indiana	32.6	+0.7	—3.3	—7.9	—3.7	+0.2	+2.4	—2.6	+3.4	+5.4	+5.4
Illinois	32.8	+0.7	—6.6	—7.1	—4.0	+4.6	+7.7	—0.3	—2.8	+3.2	+4.2
Michigan	30.0	—0.5	—5.0	—6.3	—6.8	+3.8	+8.0	+1.5	+4.0	—5.0	+6.0
Wisconsin	31.6	—4.9	—4.3	—1.8	—10.9	+0.2	+5.4	+1.4	+3.4	+3.4	+8.4
Minnesota	28.6	—2.1	—1.6	—0.3	—10.2	+2.6	+1.9	—2.6	+3.4	+4.4	+4.4
Iowa	32.1	+4.6	—3.8	+1.8	—17.1	+3.0	+6.9	—3.1	+2.9	—1.1	+5.9
Missouri	27.6	+2.3	+0.1	+0.3	—5.6	+8.4	—0.6	—1.6	—1.6	—1.6	+0.4
North Dakota	21.0	—3.0	+0.4	—0.3	—1.8	+0.3	+14.0	—4.0	—2.0	+2.0	—5.0
South Dakota	21.5	+1.0	+0.8	+2.2	—17.3	—10.4	+4.5	+2.5	+6.5	+4.5	+5.5
Nebraska	25.3	+9.9	+2.9	—0.1	—19.3	—9.2	+12.2	+4.7	—4.3	+2.7	+0.7
Kansas	21.6	+5.1	+2.9	—0.3	—10.4	+2.7	+6.4	—3.6	—5.6	+5.4	—2.6
Kentucky	26.0	+4.0	—2.7	—2.5	—3.0	+5.2	+2.0	—3.0	+5.0	—4.0	0.
Tennessee	22.1	+0.6	—1.8	—0.8	—0.2	+2.9	+0.9	—1.1	+3.9	—2.1	—2.1
Alabama	12.8	—0.1	—0.6	—1.3	+0.9	+3.1	—0.3	—0.8	+2.2	—0.8	—1.8
Mississippi	14.8	+0.4	—1.1	—1.7	+2.4	+1.0	—1.3	—0.3	+3.2	+1.2	+3.8
Louisiana	16.4	+0.9	—1.6	—2.2	—0.2	+1.7	—3.4	+0.6	+1.6	+1.6	+0.6
Texas	19.3	+0.2	+2.1	—1.7	—0.3	+7.1	—9.8	—0.8	+5.7	—1.3	—1.3
Arkansas	18.4	+2.8	—0.9	—2.2	+0.8	+3.1	—4.4	—2.4	+1.6	+1.6	+0.6
Montana	(23.8)	.....	—4.4	+3.7	+8.9	+1.2	+2.2	—5.8	+4.2	—0.8	—8.8
Wyoming	(22.6)	.....	—4.1	—4.1	+7.4	+4.9	+2.4	—10.6	+6.6	—0.6	+11.4
Colorado	19.0	+2.5	+3.3	—2.5	+0.7	+1.7	—3.0	0.	—1.0	—2.0	0.
New Mexico	21.6	—3.3	—1.6	—3.7	—2.5	+5.6	—5.6	+5.4	—0.6	—1.6	+0.4
Utah	21.1	—2.1	—3.0	+0.4	+3.3	—0.8	+3.9	+0.9	—0.1	—1.1	—1.1
Washington	(18.2)	.....	—0.2	+3.1	+2.6	—1.1	—4.2	—0.2	—6.2	+4.8	+1.8
Oregon	24.1	+2.9	—2.6	+0.6	+1.3	+2.3	—2.1	+0.9	—0.1	—2.1	—1.1
California	30.2	+4.3	+0.1	+6.9	—10.9	+4.3	+6.8	+1.3	—4.2	—3.2	—5.2

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* Relation of precipitation to yield of corn. *Yearbook U. S. Dept. of Agric., 1903.*

† Corn crops of the United States, 1866–1906. *Bur. of Stat.*—Bull. 56. 1907.

TABLE II. 1900–1909.

	MEAN	*1900*	*1901*	*1902*	*1903*	*1904*	*1905*	*1906*	*1907*	*1908*	*1909*
	Bush. p. acre:										
Maine	35.4	+0.6	+4.0	−13.7	−5.2	+4.3	−1.1	+1.6	+1.6	+5.1	+2.6
New Hampshire	33.1	+3.9	+5.4	−9.8	−12.1	−5.8	+3.9	+4.4	+1.9	+5.9	+2.0
Vermont	34.5	+5.5	+5.5	−12.7	−11.1	+1.4	+0.2	+1.0	+1.5	+5.8	+2.5
Massachusetts	36.1	+1.9	+4.4	−4.8	−12.1	−0.1	+1.4	+3.6	−0.1	+4.3	+1.9
Rhode Island	32.9	−0.9	−0.8	−4.5	−2.8	+1.2	−0.4	+0.2	−1.7	+9.9	+0.3
Connecticut	36.8	+1.2	+2.2	−5.3	−14.4	+2.1	+5.9	+3.2	−3.8	+4.5	+4.2
New York	31.0	+1.0	+2.0	−6.0	−6.0	−3.7	+0.5	+3.9	−4.0	+7.8	+5.0
New Jersey	34.1	−1.1	+2.8	+0.4	−10.1	+3.9	+1.7	+2.2	−2.6	+3.9	−1.4
Pennsylvania	34.4	−9.4	+0.6	+1.7	−3.2	−0.4	+4.5	+5.8	−1.9	+5.1	−2.4
Delaware	29.1	−5.1	+0.9	−1.1	−1.6	+1.3	+1.3	+0.9	−1.6	−2.9	−1.9
Maryland	32.9	−6.9	+1.3	−0.5	−4.2	+0.5	+4.0	+2.1	+1.3	+3.7	−1.5
Virginia	22.7	−6.7	−0.5	−0.7	+0.1	+0.6	+0.7	+1.6	+2.3	+3.3	+0.5
West Virginia	27.5	−0.5	−4.5	−1.0	−4.9	−2.2	+2.3	+2.8	+0.5	+3.7	+3.9
North Carolina	14.8	−2.8	−2.8	−0.9	−0.1	+0.4	−0.9	+0.5	+1.7	+3.2	+2.0
South Carolina	11.6	−4.6	−4.7	−1.2	−1.3	+0.8	−0.7	+0.6	+3.5	+2.5	+5.1
Georgia	11.5	−1.5	−1.5	−2.5	+0.2	+0.4	−0.5	+0.5	+1.5	+1.0	+2.4
Florida	10.2	−2.2	−1.2	−1.6	−0.3	+0.5	−0.1	+0.8	+1.1	+0.3	+2.4
Ohio	35.6	+1.4	−9.5	+2.4	−6.0	−3.1	+2.2	+7.0	−1.0	+2.9	+3.9
Indiana	34.7	+3.3	−14.9	+3.2	−1.5	−3.2	+6.0	+4.9	+1.3	−4.4	+5.3
Illinois	34.5	+2.5	−13.1	+4.2	−2.3	+2.0	+5.3	+1.6	+1.5	−2.9	+1.4
Michigan	32.7	+3.3	+1.8	−6.3	+0.8	−4.1	+1.3	+4.3	−2.6	−0.9	+2.7
Wisconsin	33.2	+6.8	−5.8	−5.0	−3.9	−3.5	+4.4	+8.0	−1.2	+0.5	−0.2
Minnesota	29.4	+3.6	−3.1	−6.6	−1.1	−2.5	+3.1	+4.2	−2.4	−0.4	+5.4
Iowa	32.3	+5.7	−7.3	−0.3	−4.3	+0.3	+2.5	+7.2	−2.8	−0.6	−0.8
Missouri	28.6	−0.6	−18.5	+10.4	+3.8	−2.4	+5.2	+3.7	+2.4	−1.6	−2.2
North Dakota	23.4	−7.4	−0.8	−4.0	+1.8	−2.2	+4.1	+4.4	−3.4	+0.4	+7.6
South Dakota	27.4	−0.4	−6.4	−8.5	−0.2	+0.7	+4.4	+6.1	−1.9	+2.3	+4.3
Nebraska	27.4	−1.4	−13.3	+4.9	−1.4	+5.4	+5.4	+6.7	−3.4	−0.4	−2.6
Kansas	22.4	−3.4	−14.6	+7.5	+3.2	−1.5	+5.3	+6.5	−0.3	−0.4	−2.5
Kentucky	26.7	−0.7	−11.1	+0.3	−0.1	+0.2	0.	+6.3	+1.5	−1.5	+2.3
Tennessee	23.0	−3.0	−8.8	−1.1	+0.5	+2.0	+1.6	+5.1	+3.0	+1.8	−1.0
Alabama	13.5	−2.5	−2.6	−5.1	+1.3	+1.5	+1.3	+2.5	+2.0	+1.2	0.
Mississippi	15.2	−4.2	−4.3	−3.7	+3.2	+3.9	−0.9	+3.3	+1.8	+2.1	−0.7
Louisiana	17.5	−0.5	−3.8	−5.0	+3.1	+2.4	−3.8	−0.3	0.	+2.3	+5.5
Texas	19.0	−1.0	−7.4	−10.9	+5.2	+3.6	+2.3	+3.5	+2.0	+6.7	−4.0
Oklahoma	24.2	+1.8	−14.7	+1.2	+1.3	+6.0	+0.2	+9.1	+0.2	+0.6	−7.2
Arkansas	18.7	+0.3	−10.6	+2.6	+2.2	+2.9	−1.4	+4.9	−1.5	+1.5	−0.7
Montana	23.2	−8.2	+1.8	−1.2	+0.9	−1.0	−3.8	+0.2	−0.7	+0.2	+11.8
Wyoming	28.0	+6.0	+11.5	−8.2	−8.6	+4.5	−1.1	−1.0	−3.0	0.	0.
Colorado	21.2	−2.2	−4.1	−4.7	−1.4	−0.7	+2.6	+6.7	+2.3	−1.0	+3.0
New Mexico	26.4	−4.4	+5.2	−4.4	−2.4	−3.7	−1.1	+3.0	+2.6	+0.6	+4.9
Arizona	26.5	−5.5	−8.5	−6.3	−4.1	−2.7	+0.5	+3.0	+11.0	+6.7	+5.6
Utah	26.9	−6.9	−7.5	−6.8	−5.5	+6.3	+9.3	+5.1	−1.4	+2.5	+4.5
Idaho	29.5	+8.5	−6.5	−4.8	+5.0	−0.2	−2.3	−1.2	+0.5	−0.5	+1.1
Washington	23.8	−3.8	−6.3	−0.8	−0.7	+0.9	+0.4	+1.4	+3.2	+1.7	+4.0
Oregon	25.8	−2.8	−5.0	−2.4	0.	+3.0	−2.8	+1.8	+1.7	+2.0	+4.9
California	31.3	−6.3	−0.3	−0.8	−0.6	−2.7	+0.7	+3.6	+2.7	+0.7	+3.5

The first table gives for each State, in bushels per acre, the average of the years 1891 to 1900 and the annual departures. The positive figures express bushels per acre above the average and the negative figures those below. The second table gives the departures for 1900 to 1909 from the means of these ten years. In this way the year 1900 is repeated in both tables, and, therefore, comparing the corresponding departures, we have a criterion of the relative value of the figures employed to draw the maps.

One sees directly that in the majority of cases the departures (for 1900) are less positive or more negative in the second table than in the first. This is due to the fact that on the average the harvests were better during the years 1900 to 1909 than they were from 1891 to 1900, a fact due, in all likelihood, to the progress of agriculture and irrigation.

I shall now take up the examination of the maps, which have been drawn in exactly the same manner as those of the wheat crops published previously.*

First, I shall take into consideration the decade 1891 to 1900, for which I reproduce the maps of 1894, 1896, 1898 and 1900.

These maps show that precisely in the same way as for the maps of temperature departures,† atmospheric pressure departures‡ and wheat crops, the areas of deficit and surplus are very extensive, but always less extensive than the entire area of the United States. One of the States, particularly favored, forms a positive center, around which less positive figures are grouped. In other places, or for another year, we observe one or more negative centers and again all around a decrease in negativity.

A striking fact is the lack of symmetry of the center of greatest departure for the positive as well as the negative areas. The map of the year 1898 furnishes an excellent example, the departure +6.5 of South Dakota contrasting with the figure —6.6 of Wyoming. In this as in other cases,—just as for the maps of wheat crops, temperature or atmospheric pressure departures,—the disposition of the positive and negative areas gives to the maps the appearance of representing the effect of a dynamical phenomenon proceeding by waves. This is clearly shown by the tendency of the areas, surrounded by equi-departure curves, to assume elongated forms.

Sometimes two or more distinct centers are connected, forming a wave, and, in other cases, such waves following different directions intersect each other. Peculiarities of one map may be found again on the map of the following year, but altered and displaced. It is, therefore, most probable that the variations of harvests depend on dynamical phenomena proceeding by waves. But if these statements lead to the conclusion that the climatic changes which affect the crops are dynamical, we must also admit that the phenomenon is too complicated to attempt its study by a simple comparison of maps drawn from annual means.

The comparison of the above maps with those giving the distribution of the surplus and deficit of wheat crops, for the same years, proves that the climatic changes, peculiar to these years, reacted very

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* *Bull. Amer. Geogr. Soc., vol. 42, p. 481.*

† Arctowski: L'enchaînement des variations climatiques. Bruxelles, 1909.

‡ Arctowski: Variations in the distributions of atmospheric pressure in North America. *Bull. Am. Geogr. Soc., vol. 42, p. 270.*

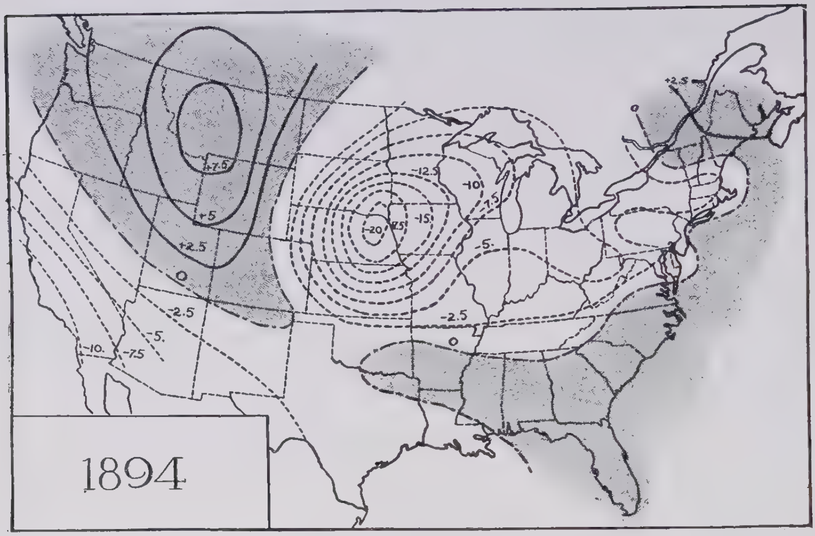

FIG. 2.

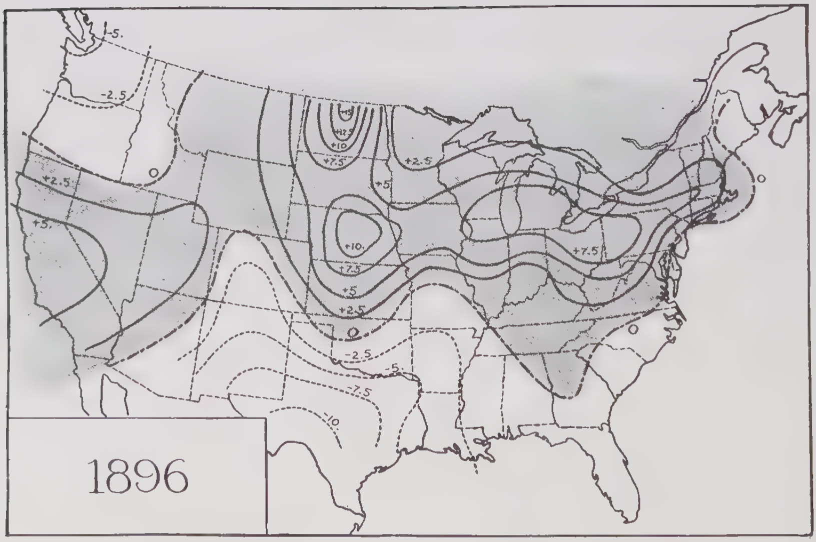

FIG. 3.

differently on corn and wheat.* The same may be said about the maps of temperature and atmospheric pressure departures, a com-

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*Concerning the crops of maize, cotton and wheat, I transcribe the following statement from a paper of A. Piatt Andrews: "Among these three crops may occur every conceivable combination of success and failure. The crops of the Southern States may be abundant when those of the Middle West are poor . . . You may find a small wheat crop, as in 1885 or in 1896, combined in each case with record breaking corn crop or *vice versa*. . ." *Quart. Journ. of Economics, 1906, p. 333.*

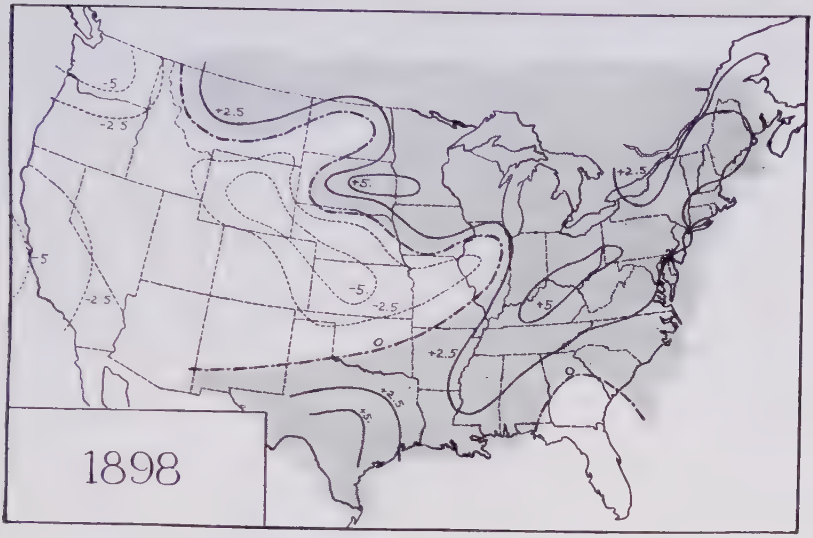

Fig. 4.

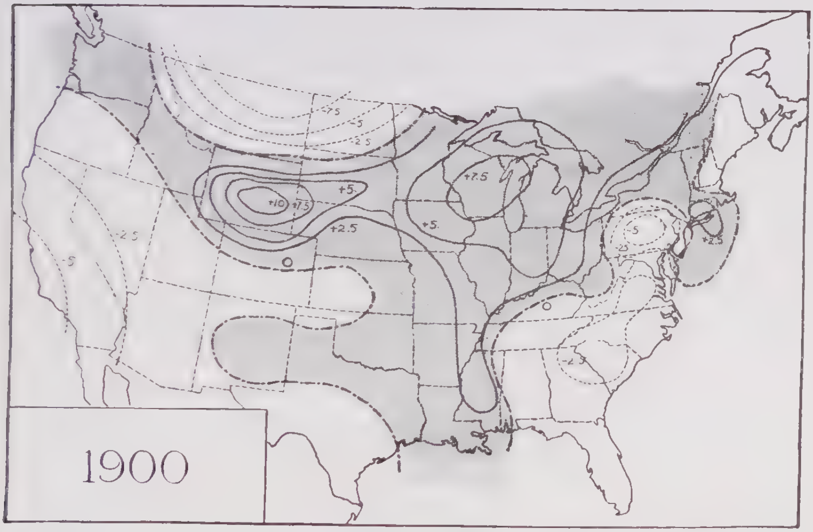

Fig. 5.

parison of which with the preceding maps shows that the apparent correlations are only suggestive,—but just enough so to warrant a deeper investigation by new researches.

It is the dynamical problem of the propagation of climatical variations which ought to be solved. As a starting point to this research,—a research for which I am at present gathering meteorological data, from all parts of the world, for the years 1900 to 1909,—I reproduce below the maps of the corn crop departures for these years. It is the cause of the particularities of these maps that I should like to understand. I will therefore describe them such as I see them.

To simplify the description I shall hereafter call those years, characterized by positive departures, *fat years,* and those for which the corn crops were below the average *lean years.* I also call *"fat"* and *"lean"* the positive and negative areas. It will also be necessary to speak of the center of a fat or of a lean wave and of the axis of such a wave.

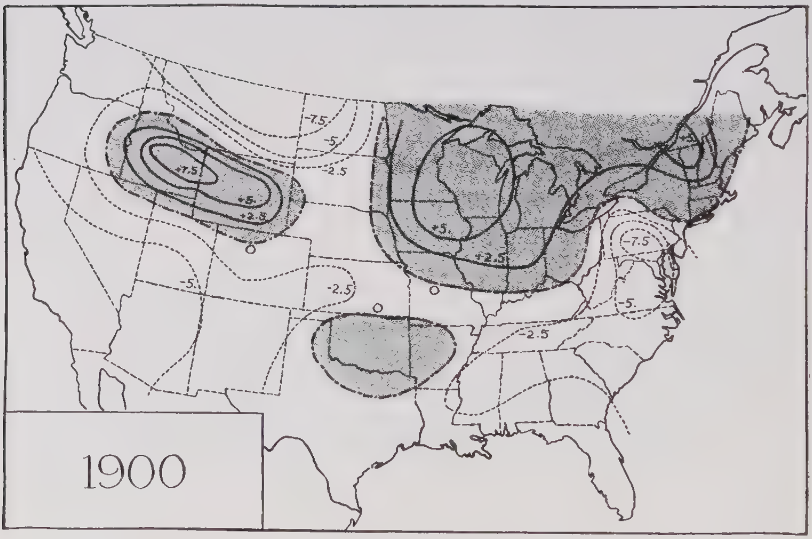

FIG. 6.

Let us now examine the maps. The map of 1900 differs from that reproduced above because of the increase in the average outputs shown in almost all of the States. A comparison of the means of tables 1 and 2 shows this increase to be particularly noticeable in the States of Delaware, Maryland, South Dakota, Wyoming, New Mexico, Utah and Washington, while it is only in the New England States and Texas that the averages of 1900 to 1909 are less than those for the years 1891 to 1900.

The distribution of the equi-departure curves, however, is obviously the same, which proves that we can draw conclusions from the appearance of the maps, that we can take into consideration even the details they present. Now, if we compare the map of 1901 with that of the preceding year we can explain it as follows: The lean extending over the Atlantic States, in the form of a wave, and whose center, with a value of —9.4, was in Pennsylvania, moved westward, developed itself considerably and became much more pronounced, the central value being —18.5.

It is truly astonishing to see how the geographical distribution of the figures agrees with the conception of a center of crop deficit. From the figure —18.5 observed in Missouri we note the figures —7.3, —3.1 toward the north, —14.9, —9.5, +0.6, +2.0, +5.5 toward the North-East. In a southeastern direction we have —8.8, —4.7, South: —10.6, —3.8, and also toward the South-West, the West and the North-West of Missouri the figures are so distributed that the equi-departure curves, far from being hypothetical, express just as plainly the resultant of a series of variable phenomena as isobars or isotherms of a meteorological map may do. And, as in the case of meteorological maps, the displacement of a center brings about the displacement of other centers, just as if they were driven ahead or carried along, we see here that the fats have been pushed away by the broadening out of the lean areas, from Wisconsin into Wyoming and from Oklahoma into New Mexico.

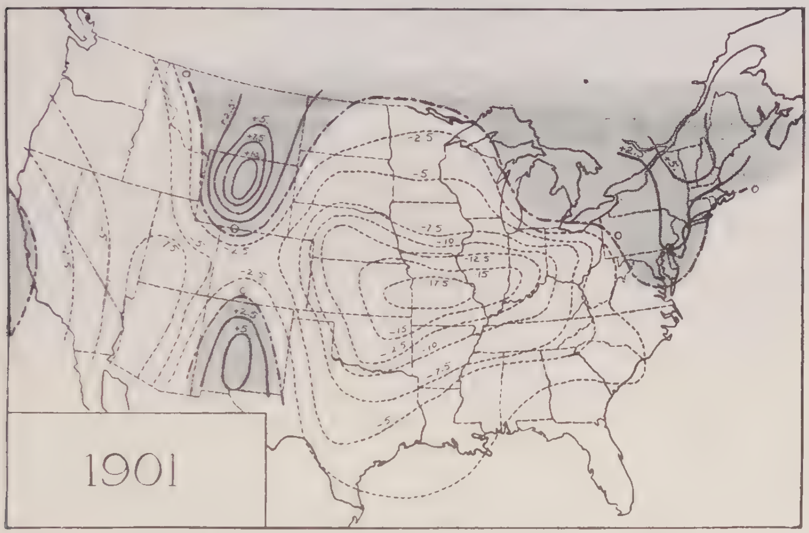

Fig. 7.

The positive wave of 1900, together with the negative saddle be-

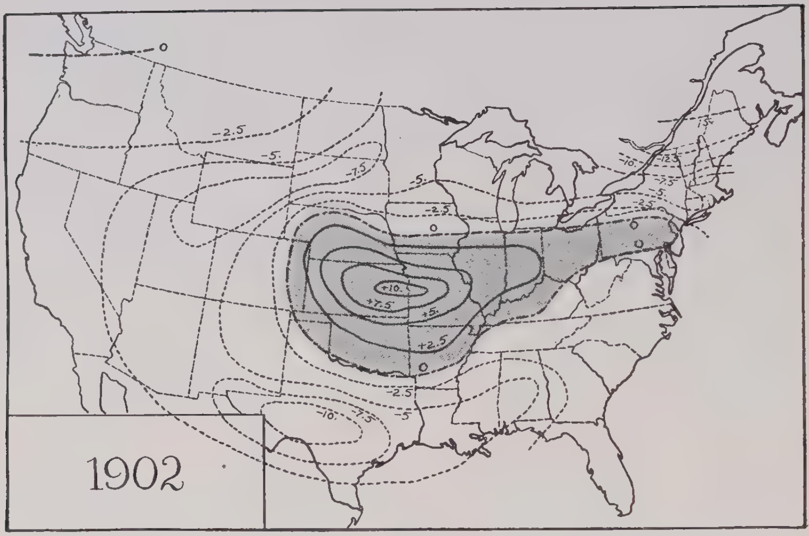

FIG. 8.

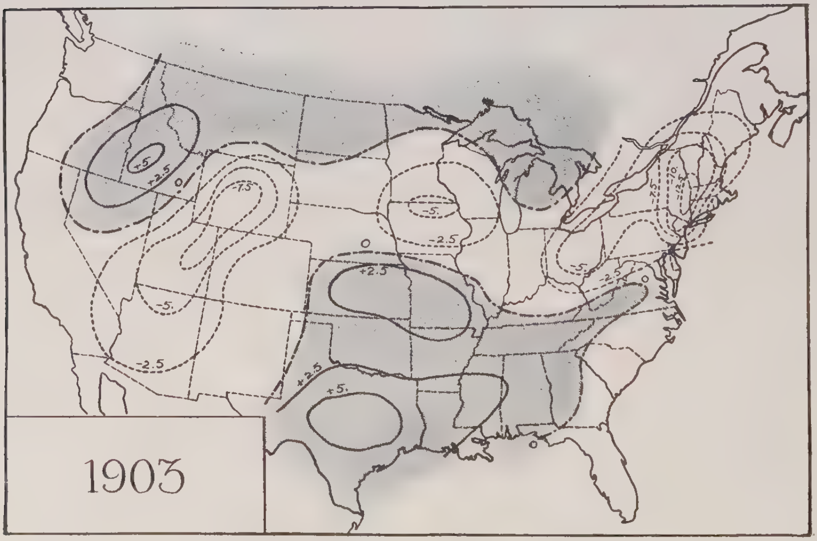

FIG. 9.

tween the two centers, has remained and the whole simply moved toward the West.

The values in the North-East, however, remained positive. In 1902, this fat seems to have been driven, in its turn, by a lean coming from the North whose departure —13.7, observed in Maine, is suffi-

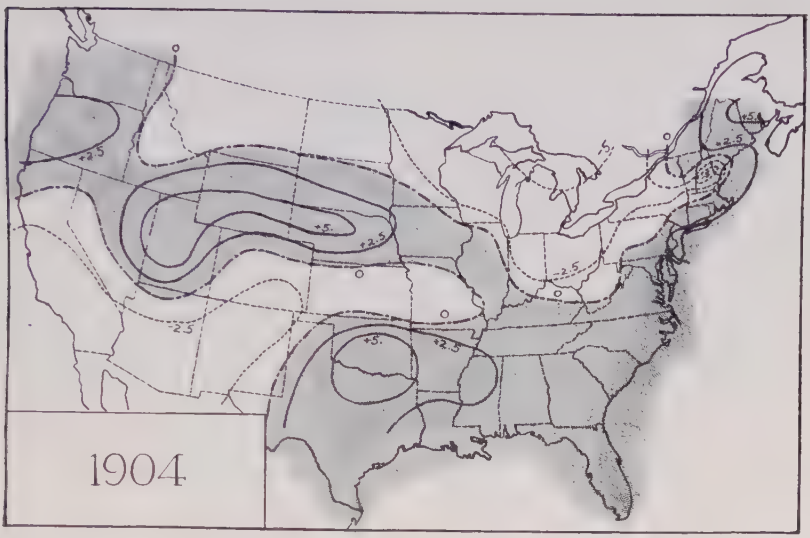

FIG. 10.

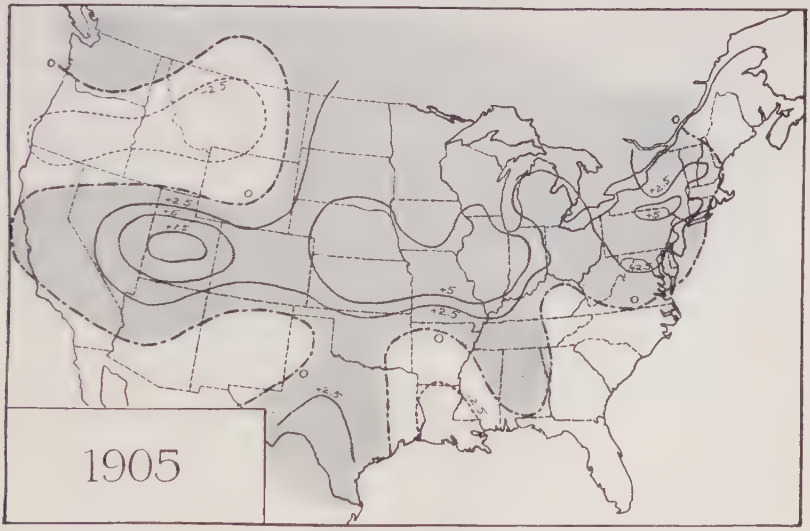

FIG. 11.

ciently characteristic. The fat has a peculiar oblong shape and its center has taken the place of the lean center of the preceding year. Moreover, the lean of 1901, pushed toward the West by this invading fat, took the shape of a horse shoe with two negative centers, one North and the other South of the fat. In 1903 it is a displace-

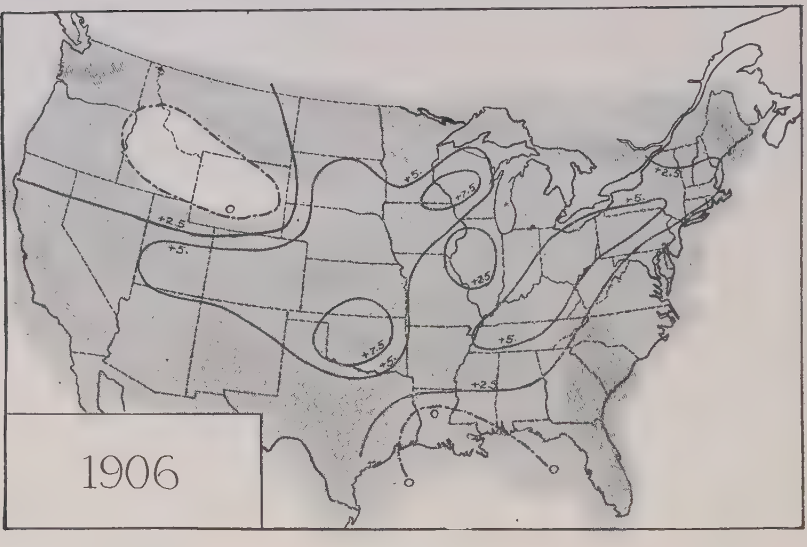

Fig. 12.

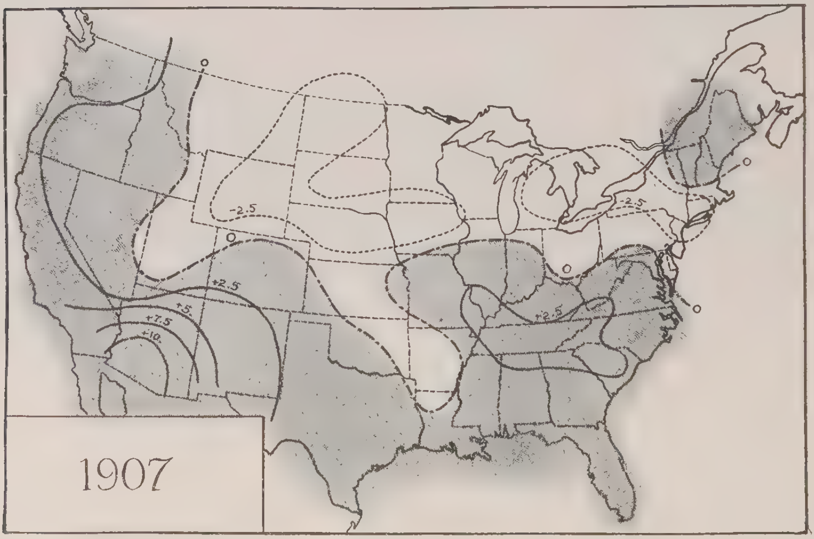

Fig. 13

ment from the North toward the South that we observe. This is seen by the position of the Northeastern lean, which moved further south. The center of the fat has moved from Missouri to Texas, and, if it is so, the lean wave extending from the Northeastern States across Pennsylvania, Ohio, Iowa, to beyond the Rocky Moun-

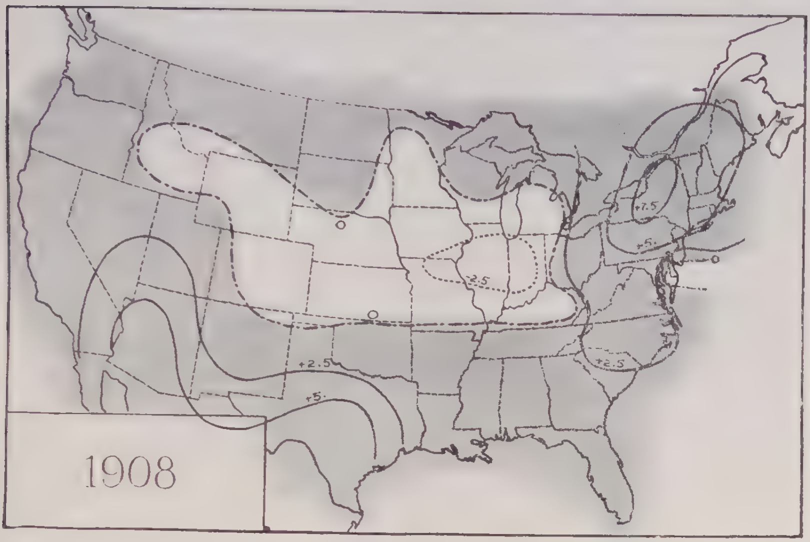

FIG. 14.

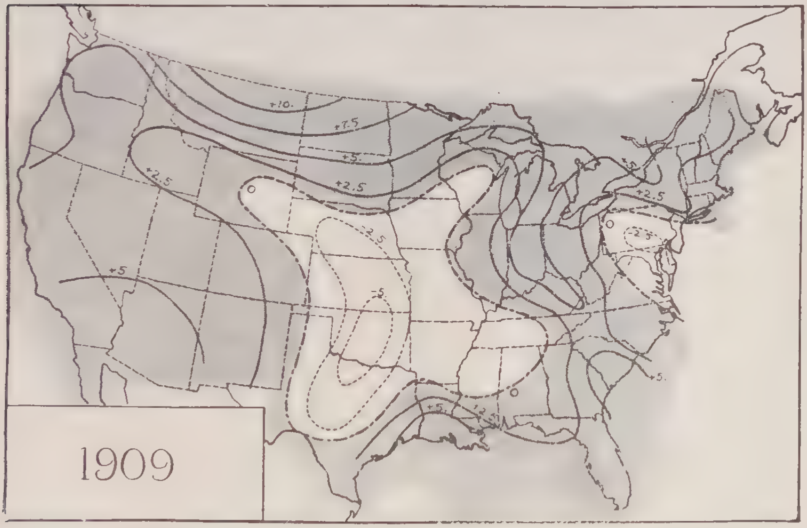

FIG. 15.

tains, where it turns South, is nothing else than the northern branch of the great horseshoe shaped wave surrounding the fat center of the previous year.

The map of 1904 (although very different from that of 1903) suggests a double displacement, from North to South and from East to West. The same may be said about the map of 1905, that year being distinguished by a fat wave crossing the continent from the Atlantic to the Pacific. If it is again a question of displacement, we may imagine that the lean of the Great Lake Region moved into Montana, Idaho and Oregon, while that which covered California, Arizona and New Mexico, with an extension going as far as Missouri, likewise moved in the same or at least in a south-westerly direction, and that it is the northeastern fat which is now observed in the central part of the continent.

The map of 1906 is that of an extraordinary year, for everywhere, except in Idaho, Wyoming and Louisiana, the departures are positive; but even there the conditions are improved. The lean of the North-West is reduced, likewise that of Louisiana, and the fat simply spread out.

In 1907 the disposition of the equi-departure curves forces us to admit that the lean, which spread over the lake region and into Montana, Utah and Kansas thrust aside to the South-East and South-West the fat centers of 1906: that of Ohio into Tennessee and those of Wisconsin and Oklahoma over into Arizona.

The map of 1908 is not less interesting. The lean remained, but decreased in size and importance. A fat coming from the North-East reduced the eastern portion of the lean. Positive values observed in Wisconsin, the Dakotas and Montana surround it completely in the north. And, the fat remaining in the South-West prevented a downward or retreating movement of the lean towards the South or West. Lastly, the map of 1909 seems to give evidence that the preceding reasonings are not simply speculations.

The differences between the positive and negative values are increased and, at the same time, there is such an analogy in the distribution of the equi-departure curves, that one must admit that the lean of 1909 is the lean of 1908, more concentrated, having been pushed by fat waves from the North and from the South-East against stationary fats in the South and South-West.

The center of the lean moved from Indiana into Oklahoma, the negativity increasing at the same time from —4.4 to —7.2. The lean in Delaware, on the map of 1908, spread out into New Jersey, Pennsylvania and Maryland. The positive wave which extended from Maine across New York into North Carolina goes now from Indiana to South Carolina.

If we take all the maps into consideration now, and try to classify them according to their general appearance, we may make the following distinctions:

Years of nearly normal conditions, years nearly uniformly good or bad and, finally, years for which the yield of crops is particularly different from one region to another. There are different ways of expressing by figures the state of agitation or anomaly which the maps express graphically. We may note the differences of the highest and lowest departures of the fats and leans, that way taking into account the maximum amplitude of the waves. We may also take the mean value of the departures at all the centers above or below the normal.

Finally, we may add also, for each year, the values for all the departures noted in the different States, without taking into consideration the sign (+ or —) of the departures. For example, in 1901 the greatest departures are —18.5 and +11.5, which according to the first method gives 30.0. By the third method the figure 274.2 is obtained.

Evidently, these figures have no real signification and can only serve as a numerical method of comparing the maps. However, the result to which one is led by making these simple additions is really curious.

The following diagram, which expresses these figures graphically, indeed demonstrates the fact that the degree of perturbation of the maize crop does not change at random from one year to another. We see increasing values from 1891 to 1894 and then a more or less progressive decrease. In 1901 we notice an abrupt increase followed anew by a gradual diminution until 1904, or even 1907, if we consider the value of 1906 as abnormal. But the interesting point is that 1893 was a year of maximum sun-spot frequency, 1901 the year of a minimum and that the following maximum was observed in 1905 or 1907.

Therefore, we see a coincidence of maxima (1894), or an inversion (1901 and 1907). This is just what has been frequently observed in the study of the correlations of meteorological phenomena with sun spot frequency, and this is precisely what so singularly complicates the discussion of the question of solar influence.

To leave no doubt about the fact the anomalies of crops reflect the anomalies of solar radiation, under the influence of climatical variations, I reproduce here below the figures giving the amplitudes of the extreme hyper and hypo-pressure waves, for 1891 to 1899, as they were published in the first of these papers.*

48, 66, 67, 71, 66, 62, 58, 54, 49.

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* *Bull. Amer. Geogr. Soc., vol. 42, p. 281.*

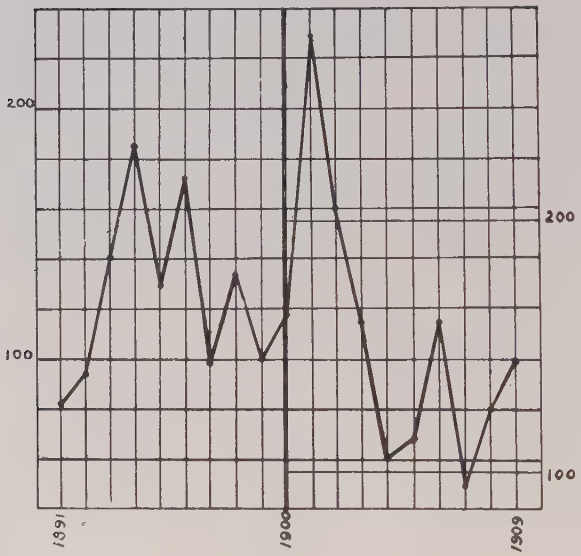

FIG. 16.

The corresponding figures of the corn crops are:

13.2, 9.9, 15.8, 28.9, 18.8, 23.6, 16.6, 13.1, 10.4.

To come back, finally, to the question of the influence of rainfall upon the crops, I will cite the following fragment from a discussion by Cleveland Abbe of a paper by H. C. Russell on the variations of atmospheric precipitation in Australia:*

> "Now, this periodicity, or rather the irregular succession of good seasons and bad seasons, is a fact recognized in every portion of the world. We also have enough data to show that in most cases a drought in one portion of the globe is accompanied by rains in other portions, and the regions of excess and deficiency of rain move over the surface of the globe month by month and year by year."

To my knowledge this last fact has not yet been proven. At present it is but a simple assertion. Considering the close correlation which seems to exist in the United States between the rainfall, during the summer months, and the crop of maize, and considering the enormous commercial importance of this cereal, I will study more in detail the question of rainfall and water resources as soon as circumstances will permit.

New York, January 21, 1911.

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* E. B. Garriott: Long-range weather forecasts. *Weather Bureau*, Bull. no. 35, p. 30. Washington, 1904.

LIFE ALONG A GRADED RIVER

BY

F. V. EMERSON
University of Missouri

(Concluded from the September *Bulletin*, pp. 674–681.)

But the very advantage of the meander swinging up to the bluffs at Brunswick carried with it a danger which all towns similarly situated must face. A flood plain meander is not stationary, but moves down the valley. The *filum aquae*, as the law terms it, or the thread of fastest current, does not occupy the middle of the stream, especially in a bend. Typically the fastest current moves as in Fig. 9. The greatest erosion is at the base (AB) of the projecting spur and the

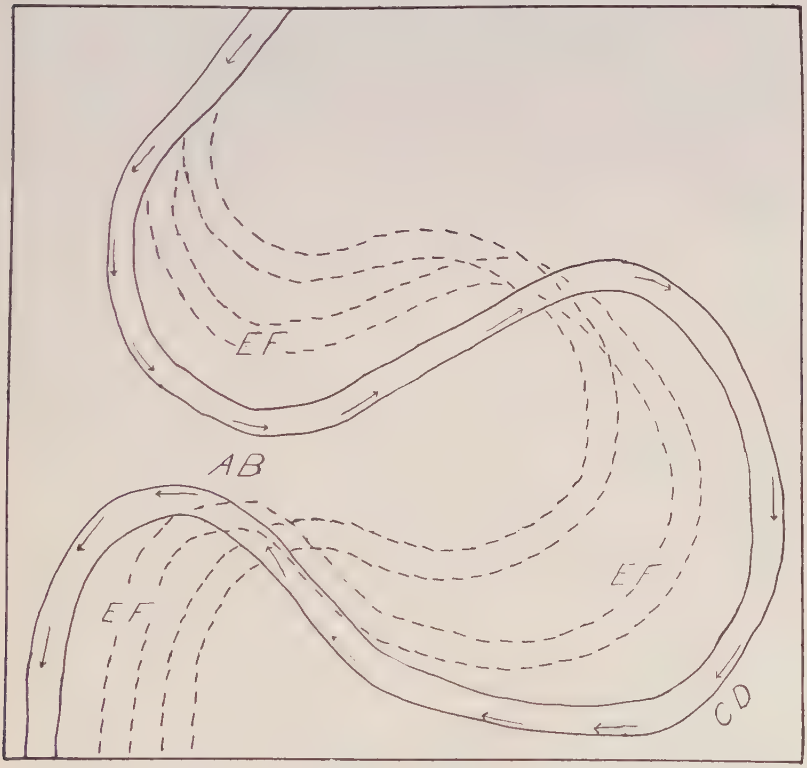

Fig. 9—Diagram to show the movement of a meander down stream. The broken lines represent former positions of the river. The arrows show the "thread" of the current.

outer and down stream side of the meander (CD). Thus the meander moved past Brunswick and finally about 1874 the river cut through its spur leaving the town several miles inland. The Grand River still occupies the eastern part of the old meander, but the channel rapidly silted up, and Brunswick was effectually shut off from the Missouri. Fortunately this cut off did not occur until the river traffic had become unimportant, and the business of Brunswick did not suffer greatly from the loss of river traffic.

The same danger has constantly threatened Glasgow. It is only by construction of revetments by the government and by reinforcing the embankments of the Chicago and Alton railroad which crosses here, that the threatened cut off has been averted. (Fig. 10.)

When the river begins actively to erode the bank of the bend, it often deposits on the opposite bank, as at E F in Fig. 9. That is the coarser load, mostly sand, which settles in the quieter water. When this occurs the river people say that the river is "throwing up sand banks." Thus construction often, but not always, accompanies destruction. These sand bars at low water become covered by a growth of willows which are often followed by a cottonwood growth. At high water the dense vegetation arrests the silt and fine sand and the bar becomes arable land. Between these bars there are often semi crescentic lakes. The entire region south of Brunswick which was at various times the bed of the river, is now composed of these ridges with the intervening lakes.

The river towns were not destined to hold their prosperity. The maximum development of the river trade occurred between 1850 and 1860. At that time one or more boats might usually be seen at any stretch of the river. In the early sixties, railroads were built paralleling the river and they took away most of the through traffic and much of the local traffic. Branches were soon built to the principal river towns and the boat traffic ceased to be profitable. Brunswick and Glasgow became terminal or division points and did not suffer so severely as many other river towns.

Agriculture. The soils of the flood plain are, of course, alluvial and their composition differs according to the velocity of the current by which they are deposited. Where the current was rapid, the soil is largely sand; where it was slower, the soil is a sandy loam or silt. Where the conditions are typical, the soil near the river is sandy and it grades in fineness away from the water through sandy loams, silt loams, to silt and clay. Often old ox bow lakes, the result of cut offs, which are entirely drained may be traced by their accompanying soil types. The old channel is often silt and clay; on one or both sides there may be a low ridge of sandy soil where the overflowing river first deposited its coarse load and from this ridge the soil grades into loam and silt as one withdraws from the old channel. (Fig. 11.)

The clay soil is locally called "gumbo." It is a heavy moist soil usually requiring artificial drainage. When drying it cracks often to the depth of fifteen inches and these cracks intersect each other giving a field a curious columnar appearance. When drained, "gumbo" is fertile soil and yields good crops, especially of wheat. The loams are the valuable lands of the flood plains, and not seldom are worth $200 per acre. They give large yields of wheat and corn. Sandy tracts are relatively or absolutely barren. Only when they have supported vegetation for several years do they become covered with silt and worth cultivation. However, sandy tracts are often bought very cheap and held in the hope that some flood will cover the surface with silt and thus make it fertile. Often a farmer will point to a field, formerly worthless, which now brings him twenty or more bushels of wheat to the acre. On the other hand, a flood sometimes

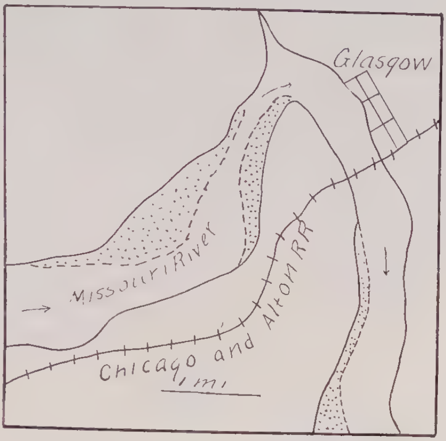

Fig. 10—Map to show river erosion near Glasgow from 1878–79 to 1880. The dotted areas were eroded between 1878–79 and 1880. (From maps of the Missouri River Commission.)

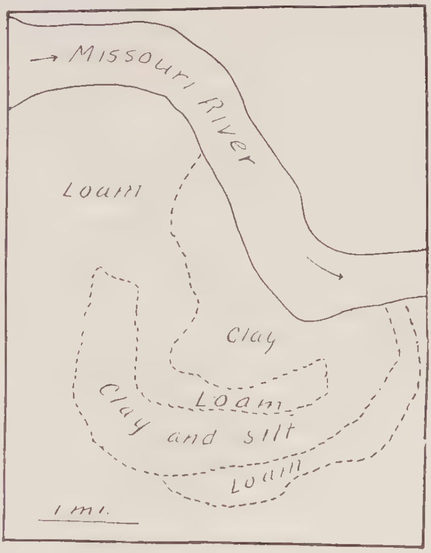

Fig. 11—Based on Soil Survey of Saline County, Mo., in 1904.

covers a fertile field with sand, making it almost worthless. Again, the floods, especially in June, may stand upon the fields so long as to drown the growing corn and wheat. Finally, there is the constant menace of river erosion, especially in the vicinity of bends. Entire farms sometimes crumble into the river in a few weeks.

The uncertainty is somewhat reflected in the agricultural methods, the land tenure and the social habits of the people. Much of the flood plain is held in large farms which are worked by tenants. The large farms are in many cases survivals of conditions in the preceding generation when lands were cheaper and large holdings common. The good soil is almost inexhaustible and yields good incomes to the owners who often live elsewhere. However, owners of small holdings, and tenants emphasize the uncertain conditions along the graded river. A man with moderate capital hesitates to invest in land which may disappear. The law provides that when the river erodes land, the owner loses all title thereto, even if, in subsequent years, the river should again restore land to the former site. Then again the possibility of crop destruction or of the land being covered with sand are deterrents to the man of moderate capital. Many of the farm buildings are incommodious and in poor repair. There is an indisposition toward making permanent improvements. For the most part, the churches and schools are located on the adjacent higher country as are practically all the villages. As far as possible, the workers on the flood plains live on the higher lands on either side.

Water Supply and Health. As compared with the uplands, the problem of water supply on the flood plain is simple. Abundant water is nearly always found by sinking wells to the low water level. At a distance from the river, the water is usually well filtered in passing through the gravel and sand of the flood plain. Open wells are often partially filled with sediment at flood time and all wells are subject to contamination from ground water. However, with reasonable care, the water supply on the flood plain is pure.

Malaria, "the chills," has always been a plague along the flood plain. Time and again its ravages have caused the depopulation of districts and towns. Cox's Bottom was settled before 1820, but a severe epidemic of malaria drove most of the settlers out. Often they abandoned partially cleared farms and cabins to escape the "chills." Old Chariton as we have seen, was laid out in 1817, a short distance from Glasgow, but was abandoned in 1829 largely because of malaria. With better drainage, the malaria is decreasing in most parts of the flood plain.

Slavery. Slavery acquired a considerable foothold in Missouri. (Fig. 12.) Its controlling influences were complex but were, to a considerable extent, geographic. Up to 1860 a large majority of the settlers came from slave holding States and brought their slaves with them. The ordinance of 1787 prevented slaves from being taken north of Missouri, and this ordinance was doubtless a powerful factor in deflecting the immigration from Kentucky, Tennessee, Virginia and the Carolinas into Missouri. The climate and soil of Missouri were favorable to tobacco, the principal crop with which the slave owners were familiar. To this crop was added the cultivation of hemp, which was produced in large quantities along the flood plain. These two crops, tobacco and hemp, were the main crops produced by slave labor on the flood plain. To some extent the plantation system was in vogue, and many of these large plantations are still held by heirs of the original owners. Neither tobacco nor hemp is now largely produced in Missouri. They have been superceded by corn and wheat.

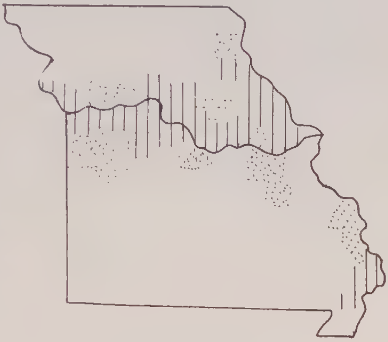

Fig. 12—Proportion of slave population in 1860. Dots indicate that slaves were 10 to 20 per cent. of population. Parallel lines, 20 to 70 per cent. of population.

Laws. The legal responses to the conditions along a graded river are interesting. The high agricultural value of much of the flood plain and the higher value of flood plain land located in cities like St. Louis and Kansas City led to many law suits, and the reports of these cases on Missouri would fill several volumes. As far as this paper is concerned, there are three principles of law that apply to the land along a graded river, namely, accretion, reliction, and and avulsion.

The Missouri river being a navigable stream, all land titles end at the water's edge. There can be no private ownership of land beneath the water. The owner of riparian lands is constantly liable to loss of land by river erosion. The legal theory is that, since the owner of such lands assumes the risk of erosion, he is entitled to any deposits which may be made upon his water-front, either by direct deposition (accretion) of the stream or by the streams withdrawing from his water front (reliction).*

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* American Decisions, Vol. 33, page 276.

However, the accretion or reliction must be "gradual and imperceptible" and not sudden (avulsion). The theory, again growing out of the habits of a graded river, is that if the erosion is "gradual and imperceptible," the property that is swept away can not again be identified.* If a house, for example, is carried away and deposited on another person's land, the owner can recover the house provided he can identify it. Of course, soil swept away cannot in like manner be reclaimed. Another reason for allowing the riparian owner title to the accretions along his water-front is that, otherwise, he would be shut off from access to the river by the accretions in front of his land.†

If land is destroyed by the river, the owner's loss is total even though the site of his property subsequently becomes land. An illustration is to be seen in Jackson County, northwest of the area described in this paper. Between 1826 and 1853 the Missouri eroded a small tract of land, but by 1896, the river had not only restored the original tract, but had added some 200 acres to the tract. However, the title was lost to the original owner when the land disappeared and it was decided that he had no claim upon the original site. (Fig. 13.)

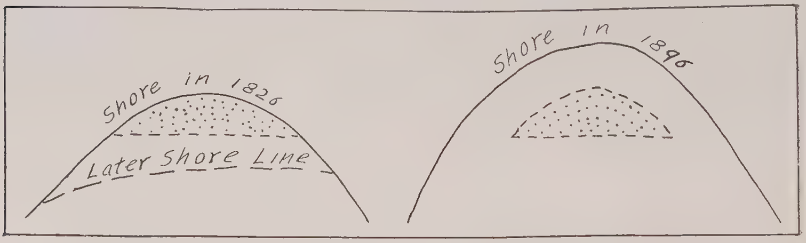

FIG. 13—The dotted area indicates the land in litigation. (Diagram from Mo. Rept., 173, p. 195, Whitcombe *vs.* Chiles.)

Islands appearing in the river belong to the State, and have to be bought from the State in order to acquire title to them. Often an island becomes connected with the shore. In such a case the riparian owner does not acquire title to the island, but only to the accretion before his water-front. In a contest as to the ownership of the land connecting an island and the mainland, it was decided that the line of division should be the middle of the abandoned channel.‡

An interesting case involving the habits of the graded Missouri and the law applying thereto was tried in 1897.* The case brought out the behavior of the Missouri from 1820 to 1897, a period of 77 years. Holmes Island, about three miles below St. Charles, and about twenty-five miles from the mouth of the Missouri, had, in 1820, a position as shown in Fig. 14. Holmes Island was purchased about 1840. In 1885, in a period of thirty-eight years, this island had almost entirely shifted down stream. The head of the island was washed away by the rapid current and, in the more quiet water on the down stream side of the island, nearly the same area had been deposited. A small island (Case Island), had formed to the northwest of Holmes Island. The situation in 1858 is shown in Fig. 15. Meantime the river was withdrawing from the south bank and leaving a portion of its deposits exposed as land. The main channel was across a part of the former site of Holmes Island.

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* Mo. Repts., Vol. 61, page 1876, Benson *vs.* Morrow.

† Mo. Repts., Vol. 118, page 403, Crandall *vs.* Allen.

‡ Mo. Repts., Vol. 86, page 209, Buse *vs.* Russell.

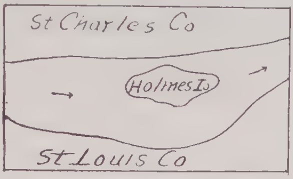

Fig. 14—Holmes Island in 1820.

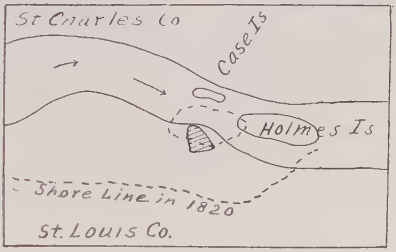

Fig. 15—Holmes Island in 1858. The broken line shows the former position of the island. The shaded area indicates the land in controversy.

Case Island was washed away and the north bank of the river was therefore the more exposed to erosion. In 1875-76 the erosion was very rapid, and the main channel rather suddenly shifted to the north of Holmes Island, leaving its old course southwest of Holmes Island practically dry. Holmes Island had, in the meanwhile, shifted still further down stream. (Fig. 16.)

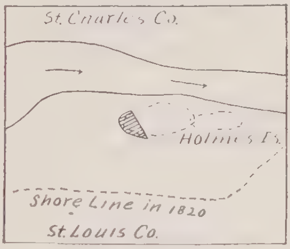

Fig. 16—Holmes Island in 1875.

It will be remembered that Holmes Island was bought in 1840. With all of its shiftings down stream the title remained in the original purchaser, and his successors, since the deposits on the lee side of the island were gradually formed contiguous to the island and were, in the eyes of the law, accretions. However, the owners of the island tried to hold possession of land which was embraced in the original deeds of the island, but which had been subsequently part of the river channel, and then had been covered by alluvium. (Figs. 14, 15, 16.) In other words, the former owners of the *site* of a portion of Holmes Island tried to hold the site notwithstanding the fact that it had formed a portion of the river channel. This contention was held contrary to law in Missouri, since the owner had lost title to the original site when it became a part of the river bed.

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* Mo. Repts., Vol. 137, page 271, Vogelsmeier *vs.* Prendergast.

Another application of river law came out in this case. The boundary between St. Charles County on the north and St. Louis County on the south is ordinarily taken as the *filum aquae* or fastest current of the river. However, it was decided that the change of 1875 was so sudden that it constituted a case of avulsion and the county line followed the old bed rather than the new channel. If space permitted many other illustrations of the legal responses to life along the graded Missouri could be given. Many of the reports are extremely interesting when they give a connected history of river activities covering a long period of time.

The statutes of Missouri provide for the drainage of swamp lands in general, which, in this State, are practically confined to the flood plains.* At present the drainage of such lands is left to the initiative and desire of the local land owners. Upon petition of owners representing a majority of the acres to be benefited, the county court appoints a commission to investigate the drainage project. If the report is favorable and accepted, the commission plans the ditches, dikes, etc., and assesses the land in proportion as it is benefited. As yet no large areas of flood plain land in Missouri have been reclaimed under this plan.

There are many indications that the former importance of the Missouri River as a free, cheap highway may be in part regained. In recent years successful attempts have been made to establish steam boat lines from St. Louis to Kansas City. The movement for inland waterways which has reached almost national importance includes the improvement of this river as one of its projects.

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* Missouri Annotated Statutes, Vol. 4.

GEOGRAPHICAL RECORD

AMERICA

The Transcontinental Excursion of 1912 at Crater Lake. Mr. J. H. Cuntz formerly of Stevens Institute, Hoboken, who is writing a series of letters to the *New York Times* on the journey of the Society's Transcontinental Excursion, describes in a letter published on Sept. 29, the automobile trip from Medford, Oregon, to Crater Lake National Park. The party traveled on this automobile excursion as the guests of the Commercial Club of Medford. Mr. Cuntz says:

"To get to Crater Lake the party had a fine automobile ride of eighty-five miles, in the course of which they ascended nearly 6,000 feet, and passed through a virgin forest of Douglas fir, yellow pine, and sugar pine, thick-set giants of the forest that aroused the admiration of the foreign members of the party to such a degree that they insisted on stopping at every opportunity to photograph some of the trees. All day, too, the party climbed above cliffs rising from 1,000 to 2,000 feet above the surface of the lake, and rowed on its transparent blue waters which in some places are 2,000 feet deep.

"In the evening the geographers gathered around their campfires, discussed the geographical and geological history of the slumbering lake and the dark, silent region around them. Crater Lake is nearly circular in shape, and has an average diameter of five miles. Its surface is more than 6,000 feet above sea level, and it is completely surrounded by cliffs, which rise in some places 2,000 feet almost vertically. Outside this rim the ground slopes away in all directions, so that the lake seems to be set on the top of a mountain. It is believed, however, that the present mountain is only the lower portion of a far larger one which towered to a height of nearly 15,000 feet and has received the name of Mount Mazama.

"It is supposed that the upper portion of this great volcano was destroyed in some tremendous cataclysm, and that it was probably engulfed, leaving the great hole which was afterward filled by the lake. On this theory, the depression occupied by the lake is not, properly speaking, a crater, but a caldera or pit. Since its formation, several small craters have opened within it, and have ejected lava and built up volcanic cones, one of which now rises 800 feet above the surface of the lake and is called Wizard Island. Some members of the party, however, maintained that the top of the mountain might have been engulfed, and still other scientists thought there might not have been any higher part of the mountain at all, and that the lake occupied what was once the real crater of a volcano."

The Alaska-Canada Boundary. Twenty-three years ago the United States took the first steps towards locating the 141st meridian which, according to the treaty of 1825, was to form the boundary between Russian territory and Canada from the Arctic Ocean to near Mt. St. Elias. In August, the United States and Canada completed the delimitation of this boundary line, 600 miles long, most of the work having been done in the past six years. It was a slow process, for the working season in that high latitude is very short, low water at times greatly delayed the survey parties in reaching the work ground, and the transportation of outfit and supplies was a difficult problem.

The second section of the Alaska-Canada boundary, also about 600 miles long, extends from Mt. St. Elias to and through Portland Channel. After the Tribunal of London settled this boundary dispute in 1904 a Joint Commission was appointed to delimit the boundary. The Commission at once set about identifying peaks which the Tribunal had named as marking the boundary line, fixing their geographical positions, connecting all the boundary peaks by triangulation and carrying on much other essential detail. The surveyors have been in the field for the past seven years and it may take some years yet to complete the work. Heavy snowfall, cutting vistas through dense growth of bushes to bring points of triangulation into view and many other obstacles have delayed the work.

SUMMER EXCURSION OF THE GEOGRAPHIC SOCIETY OF CHICAGO. Glacier National Park was the objective of the third annual summer excursion of this Society. A party of fifteen representing the Society went in by way of Belton, Montana, the western entrance of the Park, under the leadership of Mr. Jesse L. Smith, a former president of the Society. At the head of Lake McDonald, horses and pack train awaited the party and after spending a day at Avalanche Basin the party pushed on into the interior, crossing Gunsight Pass, July 20. A day was spent on Blackfoot Glacier and four succeeding days at points along the chain of St. Mary's Lakes. McDermott Lake was next visited and from the permanent camp there four side trips were made, notably one to Iceberg Lake and another to the top of a pinnacle of the Garden Wall above Swift Current Pass. Leaving the McDermott country the party explored in succession the valleys of Cut Bank and Two Medicine Creeks and followed the course of the latter out of the Park boundary to Midvale from whence the return to Chicago was made.

ASCENT OF MT. SIR SANDFORD. Mr. Howard Palmer writes to the *Bulletin:*

"This year I desired to round out our Alpine work in the Selkirks by capturing Sir Sandford, the highest peak in the range. We made this climb on June 24. In company with Prof. E. W. D. Holway I left Golden, B. C., on June 17, proceeding down the Columbia River by canoe. We employed two local men as packers and canoe men and were accompanied by Edward Feuz, Jr., and Rudolph Aemmer, Swiss guides, making the party six strong. Only the guides and ourselves, however, made the climb.

"The base camp near Sir Sandford Glacier was reached on June 23 after three days of laborious back jacking via Gold River and Palmer Creek (west branch) in unprecedentedly hot weather for this region. A black bulb thermometer in the sun read 144° F. and the shade temperature was 84° F. However, the weather was fine otherwise, though the slopes of Sir Sandford were unusually bare of snow, disclosing the underlying ice everywhere below 10,000 feet. The mountain is 11,634 feet by Wheeler's survey. This rendered the previously tried routes impracticable of ascent and forced us to adopt an exposed path beneath hanging glaciers. The westerly face of the peak, the only one that has yet offered the slightest chance for an ascent, is entirely glacier covered, much resembling the Grand Combin in the Alps. The climb therefore comprised snow and ice work entirely.

"We left camp (about 5,700 feet) two miles from the base of the mountain at 1 A. M., and reached the summit at 11 A. M. On account of the watery condition of the snow owing to the bright sunlight, the descent was begun at once, as a long traverse of a cornice along the summit ridge, fully exposed to the direct rays, had to be made. Camp was regained at 4,30 P. M. Besides many crevasses, the chief difficulty was presented by these cornices overhanging the ridge on both sides, and the slushy state of the snow.

"Although, according to modern mountaineering standards, the peak would doubtless not be ranked as difficult for an experienced party, yet decided elements of danger will scarcely ever be absent from the climb. Sir Sandford has been the goal of no less than eight attempts to scale its icy fastnesses during the last half dozen years, not counting the successful expedition. No other peak in the Canadian Rockies is known to the writer to have such a record. Only five of these have reached even the base of the mountain, and aside from our parties, only one, that of Mr. Culver of Winnipeg, in 1911, has actually set foot on the peak itself.

"Two days later, June 26, the same party ascended Mt. Adamant, northwest of Sir Sandford, just short of 11,000 feet in altitude. This climb was of an entirely different character, being mostly rock work. For ten hours the climbing was necessarily continuous owing to stormy weather. The only break was fifteen minutes at the summit. This mountain proved much more difficult, if safer, than Sir Sandford and consumed eighteen and a half hours, the return to camp being at 1 A. M. in a severe thunderstorm.

"Only a limited amount of scientific work could be accomplished. The Sir Sandford Glacier's surface motion was again determined in the hope of showing a different rate under hot weather conditions, but after the marks were set it unfortunately turned cold—even more so than at the time of the first determination, and the rate was slower. The forefoot had retreated about forty feet since 1911. Some additional survey work was accomplished to connect with previous results of the government triangulation. Numerous photographs were secured but two weeks of incessantly stormy weather forced a return with less accomplishment than was hoped for."

GROWTH OF A NEW CANADIAN TOWN. Although the track on the Grand Trunk Pacific Railway is still many miles distant from the town of Fort George on the upper Fraser River, few towns in western Canada are developing so rapidly. Fort George now has a population of over 1,500 people; two hotels, two dry goods stores, three lumber companies and a sash and door factory. The *Fort George Tribune* has been changed from a weekly to a daily paper, and all homesteads have been taken up within a radius of eight miles. Track laying on the Grand Trunk Pacific west of the Rocky Mountains on the way to Fort George is now proceeding on an average of over a mile a day and the steel reached Tête Jaune Cache early in July. This point is 1097 miles west of Winnipeg.

CLIMATE OF PORTO RICO. The climatic conditions of Porto Rico are being studied in detail by Dr. O. L. Fassig, Section Director of the United States Weather Bureau at San Juan. The increasing importance of this island, with its favorable location in the trade wind belt, its high elevations, and its agricultural possibilities, gives such an investigation an economic significance which it has not had until the present time. Characteristically uniform are the temperatures. The mean annual for the whole island is 76°; the coolest month averages 73°, and the warmest, 79°. In ten years the mean annual has varied only 1° above and below 76°. These are averages for the whole island. The towns on the coastal plain have somewhat higher means, while those along or near the summit of the main divide have lower means. The diurnal ranges are comparatively large. On the coast they average 10° or 11°. Inland, they vary from 20° to 25°. The maxima reach nearly 90° in summer on the coast, and the minima fall to about 66° in winter. In the hills, the maxima and minima are somewhat lower (87° and 61° in summer and winter, respectively). There are no well-defined rainy and dry seasons. The winter rains are comparatively light, with a minimum in February at nearly all stations. The maximum is usually in September on the east coast; in October on the south coast; in November on the north coast, while on the mountains of the interior it is in summer. The rains are usually of short duration, not more than 10 or 12 minutes on the average. Tropical and extra-tropical cyclonic rains are of comparatively rare occurrence. The mean rainfalls for the whole island by seasons are, winter, 11 inches; spring, 16 inches; summer, 23 inches; autumn, 26 inches. The physiological effects of the high relative humidity are largely counteracted by persistent flow of the trades. The constancy of these winds is remarkable. The variations in direction are from northeast to southeast, with a decided preponderance from east southeast. The average hourly velocity varies very little throughout the year. The summer thunderstorms are not severe, and attract little attention. Porto Rico is singularly free from the severer type of tropical cyclones (*Annals Assoc. Amer. Geogr.*, Vol. I). R. DEC. WARD.

IMPROVEMENTS IN THE HARBOR OF CURAÇAO. In a letter addressed to the Society, Mr. W.ct.I.th.Zelle, the Director of Public Works of the Island of Curaçao says that work has been started to deepen the harbor entrance at Willemstad by dredging over a width of 263 ft. to a minimum depth of 34.5 ft. below sea-level at ebb-tide. Steps are also being taken to light the harbor adequately so that vessels may enter or leave by night with as much safety as during the day-time.

THE POPULATION OF CHILE IN 1910. The population of Chile on Dec. 31, 1910, was calculated by the "Oficina Central de Estadistica" to consist of 3,415,060 inhabitants. This number is distributed as follows for the different provinces: Tacna, 42,925; Tarapacá, 115,940; Antofagasta, 118,718; Atacama, 65,118; Coquimbo, 178,731; Aconcagua, 132,730; Valparaiso, 299,466; Santiago, 546,599; O'Higgins, 94,257; Colchagua, 159,421; Curicó, 108,120; Talca, 132,730;

Linares, 111,773; Maule, 115,568; Nuble, 169,858; Concepcion, 225,054; Aranco, 62,259; Bio-bio, 100,495; Malleco, 113,020; Cautin, 161,935; Valdivia, 131,751; Llanquihue, 113,285; Chiloé, 91,657; Territorio de Magallanes, 23,650.

The number of births in 1910 is given as 130,052, of which 66,741 were males. The excess of births over deaths in 1910 amounted to 23,979.

THE EIGHTEENTH INTERNATIONAL CONGRESS OF AMERICANISTS. This Congress was held at the University of London, May 27-June 1, under the Presidency of Sir Clements R. Markham. It was attended by 150 foreign members. Some of the papers were of geographical interest. The following information is condensed from the *Geographical Journal* (Vol. 40, 1912, No. 3, pp. 318-320).

Waldemar Jochelson, of St. Petersburg, described the work of the ethnological section of the Riabushinsky Expedition sent under the auspices of the Imperial Russian Geographical Society, in 1908, to the Aleutian islands and Kamchatka. His party were occupied in field work there for three years, and studied the folklore of the Aleuts, their physical type, and their language, which is of Eskimo origin. Thirteen ancient village sites and some huge shell-heaps were excavated, and implements, weapons, ornaments, and other prehistoric objects of stone and bone were found in them. In Kamchatka, in the old underground dwellings and fortifications, the existence of pottery (which had been denied by former travelers) was ascertained. The mythology of the Kamchadal proved to be identical with that of Northwest America, and there is a morphological relation between the language and those of some American Indians.

Mr. J. A. Mason, a Fellow of the International School of American Archæology and Ethnology in the City of Mexico, spent four months last winter among the Tepecano or Tepehuán at their village Azequeltán in the great barranca of the Rio de Bolaños, which borders the states of Zacatecas and Jalisco, in order to study the remnant—less than one hundred of sufficiently pure blood—of this people, who claim to be descended from the more ancient inhabitants. Their religion is closely related to that of the Huichol and Cora, and the ceremonial feasts and preparation of symbolic objects form a prominent part in their lives. Formerly, "from Arizona to Jalisco, a stretch of 1,000 miles along the ranges of the Sierra Madre, there lived peoples speaking the closely connected Pima and Tepehuán languages. Together with these are found other languages, such as Tarahumare, Yaqui, and Opata, undoubtedly connected, but probably differing considerably. There are great ethnological differences between such extremes as the Pima in Arizona and the Tepehuán."

Jonkheer L. van Panhuys gave an account of the Sixth "Surinam" Expedition sent to explore the interior of Dutch Guiana, in the autumn of 1909, up the Surinam river. Near the source of one of its branches, the Gran Rio, the head of a stream leading to an unknown region was discovered. This proved to be an affluent of the Corentin, and was followed down by the expedition.

Dr. K. T. Stoepel was asked by the Berlin Museum of Ethnology, in 1911, to investigate the ancient remains at San Agustin, on the upper waters of the Magdalena in Colombia. Massive stone coffins over 6 feet long, in vaults of almost modern type covered by artificial mounds, gigantic statues, and a remarkable chamber with sculptured stone door-jambs were discovered, and further search will doubtless be fruitful of results. Dr. Stoepel brought away many photographs and drawings.

AFRICA

CHANGES OF CLIMATE WITHIN HISTORIC TIMES IN NORTHERN AFRICA. A noteworthy discussion of a much-debated question is Dr. Hermann Leiter's "Die Frage der Klimaänderung während historischer Zeit in Nordafrika" (*Abhandl. Geogr. Gesells. Wien,* Vol. 8). The author has examined the literature, old as well as recent, in connection with this investigation. His presentation of the present climatic conditions of northern Africa is one of the best published. This is followed by an account of the climate of the region in ancient times, based upon details of stream flow, flora, fauna, human habitations, and the like. Finally there comes a statement of our present knowledge of the causes of climatic oscillations.

The author reaches the conclusion that there is no evidence of any change in temperature. There has been no change in seasonal distribution of rainfall. The rain probability may be somewhat larger now. There are no reports of such snowfalls along the borders of the desert in ancient times as have taken place recently. There has been no change in the flow of water in the rivers. Vegetation and agriculture show nothing which cannot be explained by a decrease in human activity. There is no reason for assuming any deterioration of climate on the basis of change in the fauna, or in the disappearance of the large mammals. This happened as the result of human intervention. The denser population of former times was possible because the people worked harder to secure and to utilize the water. There was no greater humidity in ancient times than now, judging by the old descriptions of the desert, its extent, and its relation to traffic. Evidences of a greater degree of moisture at present may be explained as the result of climatic oscillations. The widespread belief in an increase of temperature and of dryness within historic times is not only not susceptible of proof, but there is evidence to the contrary. R. DEC. WARD.

ASIA

INDUSTRIAL EDUCATION IN THE PHILIPPINES. Recent reports published by the U. S. Bureau of Education say that great progress under American teachers is being made by the Filipinos in the field of industrial training and useful arts. In some lines, particularly in lace-making and embroidery the products of the Philippine schools compare favorably with French and Swiss products. The Philippine system of education, as American teachers have shaped it, is based on the principle that the children should be trained for their life work. Nearly 400,000 school pupils are engaged in some kind of industrial labor. This instruction begins in the primary grades both for boys and girls and the work is carried on in an advanced stage in the intermediate schools. Twenty-six well-equipped trade schools have been established in Manila and other parts of the Philippines. A college of engineering has been added to the University of the Philippines and a College of Agriculture is established at Los Banos.

RESULTS OF THE ABOR EXPEDITION. The expedition sent out by the Government of India in 1911 to punish the Abors who murdered English and Indian explorers did not accomplish its main purpose as the supplies were insufficient and it was also impossible to follow the natives into their most remote mountain fastnesses. Neither did the expedition entirely solve the problem of the identity of the Sangpo River of Tibet with the Dihong-Brahmaputra as the expedition was unable to advance far enough north, though it explored a part of the hitherto unknown stretch of the river. There is no doubt, however, that the two rivers are identical. Several large snowy peaks were fixed by the surveyors on what appears to be the main Himalayan Divide, including one very fine peak of over 25,000 feet. Many more snowpeaks were also fixed on the watershed between the Dihong and Subansiri Rivers. A survey of an area of thirty-five square miles, mapped on a scale of four miles to an inch, gives some idea of the general topography of the snowy ranges.

EUROPE

THE ROYAL GEOGRAPHICAL SOCIETY'S NEW HOME. It is announced that the Royal Geographical Society has bought Lowther Lodge and its grounds for its new premises. The price paid for the property is £100,000. Lowther Lodge was built at Kensington Gore by Mr. Norman Shaw for the father of the present Speaker of the House of Commons. The construction of the building is excellent, and it is in perfect condition. The internal arrangement is such that with little change the premises will, at an early date, be suitable for the purposes of the Society. The reception rooms on the ground floor will provide accommodation for a museum, a map room, a council room, a reading room, and a secretary's office. On the first floor, overlooking the gardens, are some fine rooms suitable for a library, while close to them are others which will be used as reading, writing, smoking, and tea rooms. Above these are rooms affording ample accommodation for the Society's school of instruction, the map draughtsman, and other officials of the Society. The house has a good basement and extensive attics, which will provide storage for books or maps sufficient to meet requirements for many years.

Attached to the house are two acres of garden ground. It is probable that the Society will part with as much of this land as is necessary to enable it to build a hall large enough to hold a thousand persons. The lack of such a hall has been for many years a cause of great inconvenience. The new premises are, it is true, at some distance from the present offices of the Society. This disadvantage, however, is more than counterbalanced by the fact that the building is in a quarter of London where much scientific work is going on, and is also easy of access from all parts of the West End. The Society has sold its present house in Savile Row at a satisfactory price, and with the money thus obtained and other funds is able to defray most of the expenditure necessitated by the purchase. It desires, however, to take possession of Lowther Lodge without incurring any financial liabilities, and an appeal is therefore about to be made to the Fellows to subscribe to the cost of the new premises, upon the occupation of which the Society will probably enter in the beginning of next year. (*Scott. Geogr. Mag.*, Vol. 28, 1912, No. 9, pp. 480-81.)

HIGHEST FLIGHT ON RECORD. The Paris correspondent of the *London Times* (weekly edition, No. 1863, Sept. 13, 1912) says that the airman Garros in a Blériot monoplane ascended from Houlgate, twelve miles from Trouville, on Friday afternoon, Sept. 6, and attained a height of 16,405 feet, thereby beating the previous highest flight achieved by Lieut. Blaschke with a passenger at Vienna on June 29. This astonishing achievement is all the more thrilling from the fact that Garros's motor broke down at the summit of this climb, so that he had to return to earth in one huge *vol plané* of over 16,000 feet. Garros landed at a place twelve and a half miles inland from Houlgate.

PHYSIOGRAPHIC NOTES ON THE BERICI HILLS, ITALY. Under the title of "La Regione dei Berici," the Italian Hydrographic Office has issued its publications No. 28 and 29 under a single binding. The work covers investigations on the morphology, hydrography and geology of this uplift and was undertaken mainly for the purpose of determining the district's water supply. The region is of special interest to the student of the earth's major tectonic features owing to its relation to the Venetian ranges, themselves forming part of the European Altaides as a portion of the westernmost southern marginal or Dinaric arc.

The Berici hills lie some 70 kms. W. of Venice, and extend almost 20 kms. to the south of the town of Vicenza. The area they cover is about 200 sq. kms. Their relief is due to a domical uplift of a series of strata extending from the Upper Cretaceous to the Lower Miocene. The range presents a festooned front to the north and is divided roughly into an eastern and western section by the Val Liona on the south and the Fimon basin on the north. The eastern section consists almost entirely of an undulating plateau which merges gradually with the plains lying north and south of it. On the east and west this section is isolated by precipitous slopes. The highest peaks are to be found within this area. These are M. Tondo (421 m.) M. Zengia (431 m.) M. Alto (444 m.). The western section is an elongated narrow band, the apex of which may be said to lie at S. Gottardo, at a height of 408 m. From this point it slopes gradually downwards until the whole uplift merges insensibly with the plains environing Spessa. North of San Gottardo a projecting spur of low relief extends almost to the town of Vicenza where the altitude decreases to about 160 m.

The notes taken on the field led the observers to infer that the Berici hills taken together with the Montegalda and the Euganei hills may be considered as the remotest and weakest folds of the folding by which the most recent Tertiary formations were brought to light.

A study of the region's geology seems to bring out the fact that these hills were submerged during the Upper Oligocene beneath a relatively shallow sea in the bottom of which frequent explosions occurred. The physical and biological conditions prevailing at that time were in many respects like those observable to-day in Polynesian waters. LEON DOMINIAN.

Cities in the Russian Empire with more than 100,000 Inhabitants. The Russian Empire has now thirty-two cities each with more than 100,000 inhabitants. Fifty years ago, in 1862, there were only five cities with more than this population. These were St. Petersburg, Moscow, Warsaw, Odessa, and Riga. The present great cities of the Empire with their population are as follows:

St. Petersburg	1,907,000	Helsingfors	144,000
Moscow	1,618,000	Tula	132,000
Warsaw	848,000	Kishinev	131,000
Odessa	540,000	Samara	125,000
Kiev	501,000	Irkutsk	112,000
Lodz	385,000	Minsk	110,000
Riga	350,000	Vladivostok	108,000
Kharkov	225,000	Orenburg	105,000
Saratov	205,000	Tomsk	105,000
Baku	202,000	Nizhni-Novgorod	104,000
Vilna	200,000	Nikolayev	104,000
Tiflis	200,000	Kokand	103,000
Tashkent	188,000	Namangan	103,000
Rostov on Don	160,000	Dvinsk	101,000
Yekaterinoslav	150,000	Omsk	101,000
Astrachan	148,000	Yelisavetgrad	100,000
Kazan	145,000		

(*Geogr. Zeitschr.*, Vol. 18, 1912, No. 8, p. 468.)

POLAR

The German Arctic Expedition. Next spring a German Arctic expedition is expected to sail north for the reexploration of the Northeast Passage. According to *Petermanns Mitteilungen* (Vol. 58, 1912, August, p. 294), the leader is Lieut. Schröder-Stranz and the scientific staff will consist of Dr. Max Mayr of Munich (geography and geology), Dr. Rüdiger, Rostock (oceanography), Dr. E. Detmers, of Hanover (zoology), and Dr. Wenke, Berlin (botany). Meteorological and physical studies and investigations in terrestrial magnetism will be carried on by Capt. Ritscher and Lieut. Sandleben of the ship's officers. The commander of the ship will be Capt. Berg, who has made numerous journeys in the waters of North Siberia.

The chief purpose of the expedition is to make a thorough study of the Northeast Passage. If conditions are favorable during the first winter season, the interior of the Taimyr Peninsula will be explored; or possibly a detachment from the ship will spend the summer there while the ship is engaged in oceanographic work, coast surveys, and the study of coastal islands. The expedition expects to spend three summers in the thorough exploration of the entire Northeast Passage and to return home by way of the Pacific and Atlantic Oceans. Most members of the expedition have been spending the past summer in Spitzbergen for training in ice work and testing the scientific instruments. *Annalen der Hydrographie und Maritimen Meteorologie* (Vol. 40, 1912, No. 9, 449), says that the firm of Stocks & Kolbe is building a first-class Polar exploring vessel for the expedition. The cost of the enterprise will be about $400,000.

Meteorology in Spitzbergen. Dr. Hergesell, in the summer of 1911, established a meteorological station in Spitzbergen for the purpose of making observations extending over a whole year. With pilot and captive balloons and kites, records up to a height of 7,000 meters were secured. Dr. Rempp and Dr. Wagner who were in charge of the station also took an unbroken series of magnetic and seismic observations. The work is to be continued for another year.

M'Clintock's Famous Yacht. The little vessel *Fox*, one of the most renowned of Polar ships, recently sank on the west coast of Greenland. (*Deutsche Rundschau f. Geogr.*, Vol. 34, 1912, No. 12, p. 589.) It was the *Fox* that carried Capt. M'Clintock and his party in 1858 westward along the channels of the Parry Archipelago to winter quarters in Bellot Strait. In the spring of 1859 sledging parties from the *Fox* discovered on the west and south coast of King William Land skeletons and articles that told the terrible tale of the fate that had befallen the Franklin Expedition. No later expedition discovered anything that threw much further light on the fate of the party, though more relics and testimony from Eskimos were secured, particularly by Schwatka.

DR. BRUCE'S SPITZBERGEN EXPEDITION. Dr. W. S. Bruce, the Polar explorer, has returned to his home near Edinburgh from his surveying expedition with Dr. R. N. R. Brown in Spitzbergen. The *London Times,* says the explorers, made a detailed topographic survey and a general geological investigation of the region they traversed. They traveled from Bjona Haven to Advent Bay by a new overland route in which it is believed foxes, ptarmigan, and other game once abounded. In their journey of nearly sixty miles they saw no game but only skeletons. Dr. Bruce strongly condemns the wholesale extermination of animal life which is being carried out in Spitzbergen by gun, trap, and poison. He says Norwegian hunters habitually prepare poisoned bait for bears, foxes and other animals. Strict measures should be taken to protect the fauna of Spitzbergen which is now being rapidly and ruthlessly destroyed. He mentions the important development of the coal mines in which American capital and enterprise are chiefly engaged and of other mining activities, financed by British capital. The Norwegians are developing means of communication by post and wireless telegraphy.

GENERAL

NEW GEOGRAPHICAL PUBLICATION. Under the name of *La Geografia,* the Istituto Geografico de Agostini issued at Novara, in June, the first number of a bimestrial publication devoted to the interests of geography. The aim of the publishers is to render their bulletin especially interesting to teachers and students of the science, and to contribute to the improvement of educational methods in Italy. Special articles will also be printed on geographical and kindred topics and much attention will be paid to cartography and economic and commercial geography. The editors are Messrs. Albino Machetto and L. F. de Magistris. Both are well known to Italian geographers. The cartographic section has been entrusted to Mr. Achille Dardano who has won well-merited distinction as a cartographer in his own country and abroad. With these men and under the auspices of the Istituto Geografico de Agostini there is no doubt that this publication will usefully cooperate in the spread of sound geographic knowledge in Italy.

THE ANTIQUITY OF MAN. Professor A. Keith in a lecture in London on "Modern Problems relating to the Antiquity of Man" said he could not cite a more stalwart representative of the orthodox opinion to-day than Professor Boyd Dawkins, who held that man was evolved during the Pleistocene period, and was therefore, from a geologist's point of view, a recent addition to the earth's fauna. A moderate figure for the duration of the Pleistocene period was 400,000 years, and it might be taken as the orthodox opinion that the dawn of the very earliest form of humanity lay 400,000 years behind us, and in that time man as he was now known had been evolved from a crude, almost prehistoric form. Taking the view of M. Rutot as representative of modern heterodoxy, he pointed out that if his claim to have traced man by means of his eolithic culture through the long Pliocene and Miocene periods, and even into the Oligocene period, were admitted, on the estimates of Professor Sollas, which were disputed by M. Rutot, the antiquity of man must be placed at over 3,000,000 years.

The problem of man's antiquity was not yet solved. The picture he wished to leave in their minds was that in the distant past there was not one kind, but a number of very different kinds of men in existence, all of which become extinct except that branch which had given origin to modern man. On the imperfect knowledge at present at disposal it seemed highly probable that man as we know him now took on his human characters near the beginning of the Pliocene period. How long ago that was must be measured by the changes which the earth and living things had undergone, and yet it was only human to try to find a means of measuring that period in a term of years, and the estimates at hand gave an antiquity of at least a million and a half of years. (*The London Times,* weekly edition, Sept. 13, 1912.)

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

California, its History and Romance. By John S. McGroarty. 393 pp. Ills., index, appendices. Grafton Publishing Co., Los Angeles, 1911. $3.50. 9½ x 6½.

We fear that the purpose of this volume is to become a part of the world's fair which is projected for the Pacific Coast upon the completion of the Panama Canal; otherwise it would be difficult to account for the odd mixture of enthusiastic description and somewhat arid statistics. For those to whom access is not convenient to the work of Hittell and Bancroft this volume offers a narrative of the history of California down to the time of the great discovery of gold and the creation of the State. The author devotes considerable attention to the Bear Flag Republic, an act of undisciplined sovereignty which in California tradition is vested with a halo of romance not wholly borne out by the sober facts of pioneer roughness. It is usual, and really pardonable, for Californians to overwrite when their theme is their Golden State.

William Churchill.

The Conquest of the Cœur d'Alenes, Spokanes and Palouses. The Expeditions of Colonels E. J. Steptoe and George Wright against the "Northern Indians" in 1858. By B. F. Manring. 280 pp. Ills. John W. Graham & Co., Spokane, Wash. $1.25. 8 x 5½.

This is a detailed account of one of the many romances that make the history of early days in our West. The scene is in the neighborhood of Fort Walla Walla and the year was 1858 when the far west was in a turmoil. The main theme centers around the expeditions of Col. Steptoe and Col. Wright into the country of the Cœur D'Alenes, Spokanes and Palouses. The early chapters relate the story of the march of Steptoe to the north to quell the excitement among the Palouse and Spokane Indians and to offer protection to the scattered population. The engagement of his command with the Indians at Tohotonimme, the withdrawal of the forces to "Steptoe Butte" and the retreat during the night are told with little color and presumably wih great accuracy. Upon Steptoe's return, it was deemed necessary to subjugate the northern Indian tribes, and Col. Wright was despatched for this purpose. The last part of the book is an account of his expedition and its successful issue. At the end of the volume are biographies of Col. Steptoe, Capt. O. H. P. Taylor and Lieut. William Gaston, the two last being officers who were killed in the Steptoe expedition.

While the book records interesting events in Indian warfare, it is not presented interestingly. The story has been gleaned from correspondence between headquarters and the field staff and from official records of Indian treaties. Many of the letters are copied verbatim and the reader, to get the story, has to read a large amount of official correspondence. Robert M. Brown.

Fifty Years in Oregon. Experiences, observations and commentaries upon men, measures, and customs in pioneer days and later times. By T. T. Geer. 536 pp. Ills. Neale Publishing Co., New York, 1912. $3. 9 x 6.

An autobiography of a man now past sixty years of age who has been closely identified with the political life of Oregon as member of the legislature and as Governor must also of necessity be, to a large degree, a history of Oregon. Born in 1851 of pioneer parents at a time when Oregon was a home for missionaries or employees of the Hudson Bay Company, the early life of Geer was spent under the influence of the brave men and women who battled with primitive conditions in a new land. The opening chapters tell the story of the accession of Oregon as a territory of the United States; and like a true Oregonian, he has nothing but derision for the early opponents of the acquisition of the northwest. He pays high praise to the missionaries of the Methodist Church and the struggles of their leaders are recounted with sympathetic insight into the work and the sacrifices that were made. The beginnings of Williamette University, coincident almost with the coming of the white men, and its growth through the years, illustrate the story of the educational progress of Oregon. One of the interesting features of the book is the diary kept by a pioneer woman as she crossed the plains in 1847. The first date is April 21, 1847, written at La Porte, Ind., and the record for a while is a brief statement of the distance covered each day and the condition of the weather; but as the stranger conditions of the high plains and the mountains were encountered the account becomes fuller and more descriptive. The last record given is for February 24, 1848, near Portland, Ore.

The author recounts, with much humor, his "breaking into literature and politics" by an editorial he wrote for a newspaper. From that time his life was bound up closely with the political activities of Oregon. A review of the territorial government, the admission of Oregon to the Union, the situation and issues during the civil war, the presidential campaign of 1868, the writer's service as a member of the lower house in the legislature are given. Then comes the account of his stewardship as Governor of the State. He is a loyal son of Oregon and his story is imbued with spirit and vigor.

ROBERT M. BROWN.

The Yosemite. By John Muir. x and 284 pp. Maps, ills., index. The Century Co., New York, 1912. $2.40. 8 x 5½.

This book represents many years of research by a naturalist. It will probably take its place as the authoritative guide to the Yosemite region. In 1868, John Muir visited this famous valley for the first time. The book opens with a description of the region, the cañons and falls, first when they are bordered by ferns and flowers and again when the winter gives to the valley a wholly different aspect. A paragraph on the rainbows seen at the Bridal Veil and Vernal Falls contrasts with another describing the enchantment of the valley when the moon lights the ice-coated borders of the falls. One phase of the valley is noted in an account of the extraordinary storm and flood of 1871; another, in the description of snowstorms and avalanches. Not every man who has been caught in an avalanche could say that "this flight in what might be called a milky way of snow-stars was the most spiritual and exhilarating of all modes of motion I have ever experienced." The book is a guide also to trees, flowers and birds; and it outlines the geological history and especially that of the ancient Yosemite glacial invasions.

The tourist will be certain to read the chapter on how to spend one's time in Yosemite. Two one-day excursions, two two-day excursions, a three-day excursion, an excursion to the Upper Tuolumne and a number of short carriage trips are outlined. The history of the occupation of the valley begins with the difficulties between the Indians and the pioneers during the gold rush of 1849-50 and ends with the establishment of the Yosemite railroad. A tribute is paid to two good old pioneers, Lamon and Galen Clark, who saw and knew most of the phases of the noted valley. The book ends with a description of the Hetch Hetchy Valley.

ROBERT M. BROWN.

The Kentucky Mountains. Transportation and Commerce, 1750 to 1911. A Study in the Economic History of a Coal Field. By Mary Verhoeff. Vol. 1, xiii and 208 pp. Maps, ills. John P. Morton & Co., Louisville, Ky., 1911. $5. 12½ x 10.

In a stately volume we have here a demographic study of particular interest. Long neglected, the society of the Appalachians is now coming into study and a rich harvest is being gathered by the historian and the sociologist. For her central theme Miss Verhoeff has selected the highway system of the mountains, their development under the stimulus of social needs and their strict accord with geographical conditions of the barrier mass. From this introduction she passes to a detailed study of each of the main highways with its feeders and cross links and discusses the effect which each has had upon tributary territory. At every point she discusses the relation and interrelation of the several elements, the Indian trail following the path of least resistance or the trail which promised the richest reward to an animal-slaying nomad, the riverine paths which opened the way for pack-animal and later for wheeled transport, the settlement conditioned by the nature of the soil to which each such path gave access. In the end she discusses the decadence of the old highways when newer methods of transportation established conditions with which these ancient paths could not compete. It is a most complete monograph, it cannot fail of interest to those who enjoy the view of forgotten nooks of our country.

William Churchill.

SOUTH AMERICA

In den Wildnissen Brasiliens. Bericht und Ergebnisse der Leipziger Araguana-Expedition 1908. Von Dr. Fritz Krause. viii and 512 pp Maps, ills., index. R. Voigtländer, Leipzig, 1911. Mk. 12. 9½ x 7.

The region traversed by this small but excellently conducted expedition lies in close proximity to the meridian of 50° W. through nearly 25° of latitude, between Pará and Santos. It supplies us with fresh information from the states of Pará, Matto Grosso, Goyaz, São Paulo and Minas Geraes. The opening section of the volume, the diary of exploration, is very personal, a careful record of Dr. Krause far from Leipzig set in the heart of the Araguaya country. After one recovers from the feeling of objection to the personal pronoun (and *ich* does not produce quite the effect of I), there is much to be said for this manner of record. In mathematics one would think of it as tending to establish the personal equation, a factor that must enter quite as largely into ethnographical research. We are thus able to weigh the results presented impersonally in the larger half of the work where the author records very carefully worked out notes upon the Indian population of the region. It is a very inspiriting record. The observation has been keen and successive observations are very carefully associated. There results an appearance of precision and breadth which in itself establishes the value of these studies. It is agreeable to find that in the elaboration of the economics of the savage life which passed under his examination the author has by no means neglected the topic of amusement. Experience has shown that the savage is not the solemn person he may seem when in the presence of the intruder. Those of us whose lot has for years been cast with primitive peoples have had to learn that life at the bottom of the scale is quite as much a game as it is a struggle. The fuller the record we possess of the sports of the wild the better we shall be equipped to approach the topic of the psychology of immature races, a topic which now clamors for examination. In the not inconsiderable nook of earth in which Dr. Krause has been busy his record of the amusements and the toys of the Indians will long be cited as basic information.

William Churchill.

AFRICA

Africa of To Day. By Joseph King Goodrich. xvii and 315 pp. Map, ills., index. A. C. McClurg & Co., Chicago, 1912. 7½ x 5.

Like a somewhat larger work "Actual Africa," by Frank Vincent, this book purports to give a semi-popular account of the conditions and problems of the once "Dark Continent." Like the earlier work, the book is both entertaining and instructive. The author has successfully woven in enough history and tradition to touch off his up-to-date pictures and to show that the physical conditions operating in present day problems have been factors throughout the ages.

After a brief but informing presentation of the various sections of the continent—Northern Africa, The Desert, Oases, Egypt of the Ancients and of Today, The Nile, Central, Eastern, Western and Southern Africa, the discussion turns to several general questions of pertinence. His description of the desert is excellent, and his discussion of oases very informing.

In his discussion of "The Blacks in Africa," he says that they are inferior to the whites in many ways, but keener in some ways; and the conclusion is that the blacks should be elevated for what they are worth by concerted action of governments, merchants and teachers.

In "Everybody's Africa" the scramble for territory is described and the present partition outlined. An extensive bibliography is appended.

G. D. Hubbard.

Entre le Niger et le Tchad et à l'Est et au Nord-Est du Tchad. Par G. Garde. 284 pp. Maps, ills. A. Hermann et Fils, Paris, 1911.

This is one of the recent contributions destined to throw some light on that portion of north-central Africa lying east of the river Niger and beyond lake Chad, roughly to meridian 17° east of Greenwich. The author investigated it in the course of his field work as a member of the Tilho boundary commission (1906-1909). He treats the subject from the geologist's standpoint. As usual, however, the geologist has to depend to some extent on purely physiographic facts for the elucidation of geologic problems. As a result, two sets of data are available for the sifting of a few geographic notes.

The work is divided into two main parts. The first refers to the district beginning at the Niger's east bank and extending to the lake Chad basin. The second deals with this lake and the hydrographic system related to it. A brief allusion is also made to the interesting alkaline rocks of the Zinder and Mounio districts. The first part is subdivided into two parts, of which one is a description of the physical geography of the region while the other is restricted to its descriptive geology. Due importance is granted here to the action of erosive agencies whether aqueous or eolian.

As a whole, the work constitutes an excellent preliminary investigation of the evolution to the present stage of aridity of a region which was once exceedingly well-watered. The study of its physiography has placed a powerful tool in the author's hands for the deciphering of this gradual change. The evidence of former active fluvial erosion are the presence of wide valleys and isolated buttes, as on the Adar-Doutchi plateau. Aside from the decrease in the amount of atmospheric precipitation, this aridity of quite recent times is generally ascribed by Dr. Garde to the gradual dissolution of a ferruginous sandstone capping, remnants of which still form the uppermost layers of the resisting lumps of the dissected plateau.

The stratigraphic investigation led to simple conclusions. A basal crystalline band underlies the region. Above it rest detrital accumulations of a sandy-argillaceous character which sometimes attain thicknesses of over 100 meters. Fossilliferous limestones were found to be intercalated with the latter. The most important results in this field appear to be the discovery of a petrographic province characterized by the presence of alkaline rocks in which strong evidence of consanguinity to the igneous rocks of the Sudan region was revealed.

The main physical features of the lake Chad basin are clearly set forth. The lake is described as the remnant of a former extensive sheet of water. The evidence brought forward is not very conclusive, however. No mention is made of earlier shorelines illustrating former levels. On the other hand the presence of lacustrine deposits was recognized. The author insists on lake Chad being an independent outlet for the basin's watercourses. As a corollary to this assertion the existence of the lake is assumed to continue as long as it will be fed by this supply, of which the Shari river contributes a notable proportion.

The petrographic notes tend to show that the igneous rocks of the region are all products of a single magma. They are all siliceous. Students of African geology will find a comprehensive bibliography referring more especially to the region examined by the author, inserted at the very beginning of the work.

LEON DOMINIAN.

The Natives of Kharga Oasis, Egypt. By Aleš Hrdlička. vi and 118 pp. Ills. *Smithsonian Miscell. Collections*, Vol. 59, No. 1, Washington, 1912.

In cooperation with the important work of archæological research conducted by the Metropolitan Museum in the Nile Valley, the Smithsonian Institution commissioned Dr. Hrdlička to undertake the anthropological examination of the population of the Kharga Oasis. It is an obscure abode of men of scant moment in the great march of history which has swept for ages up and down the great valley of the Nile. Set apart by arid stretches of sand from the great civilizing movements this cluster of mankind has undergone the minimum of change. It has no history, for it has lived unnoticed, its poverty has attracted no conqueror and its only modifiers have come from the zeal of religious movements. All the record of the past takes up no more than a half dozen introductory pages of this monograph. Little more space is needed for the record of the present social condition of the oasis, a speck of fertile land where for immemorial centuries nothing has ever happened so continuously as to establish the rule that nothing happens now.

It is primitive soil for the operations of physical anthropology, Dr. Hrdlička has reaped it most closely up to the point where religious convention put a stop to his investigation. The Oriental tabu of women has prevented the extension of his studies on the distaff side. Within the area thus left open to him the author's observations have been singularly complete. In table massed upon table he gives us the most extensive record of the physical measurements of the Kharga men. Nor does this by any means complete his idea of what such work should be. Each of the critical indices of measurement is discussed independently, and where the author establishes comparison with neighbor folk the result is always most enlightening. This monograph is most earnestly to be commended to anthropologists as setting a model for the presentation of the results of such study.

WILLIAM CHURCHILL.

ASIA

Biblical Geography and History. By Charles Foster Kent. xviii and 296 pp. Maps, index. Charles Scribner's Sons, New York, 1911. $1.50. $7\frac{1}{2}$ x 5.

Professor Kent's book on Palestine is a good illustration of the fact that geography, in the broader sense, is still in its early youth. It is written in a clear simple style, the arrangement and proportion of parts are admirable, and the book as a whole gives the reader a clear conception of many of the most important ways in which the physical form of Palestine has influenced its history. Nevertheless the modern geographer reads it with the feeling that from the standpoint of the latest developments in his science it is lacking in certain important respects. Journalists, statesmen, theologians, soldiers and men of various other professions write books on geography, and often succeed in producing work of genuine value. In the present stage of his science, the geographer welcomes such volumes, yet he regrets that they are almost sure to be largely empirical.

The work under review falls into the class of the better geographical works written by men who make no claim to be geographical specialists. The first seventy pages are devoted to a painstaking and minute description of the location, boundaries and general appearance of each of the main divisions of Palestine, but in no case is any use made of the modern science of physiography and its nomenclature. The chapter on Jerusalem is one of the best in the book, since more than almost any other it presents a concrete case of cause and effect. The next section is a chapter devoted to the interesting subject of the highways of the Biblical world. The mere statement of the location and nature of the highways occupies most of the space that can be devoted to this subject, leaving little opportunity for specific illustration of the effect of individual lines of communication upon the people.

The remainder of the volume is devoted to what is commonly called historical geography. Assuming that the reader possesses a somewhat intimate knowledge of Hebrew history, the author proceeds to a detailed discussion of where each particular event took place. Much space is given to the identification of sites and the determination of the routes followed by the migrating tribes, invading armies and individual travelers of the Biblical narratives. Battles and their relation to topography are discussed in detail.

Professor Kent's volume is not adapted to rapid reading, since it contains a great number of details which cannot be remembered unless read slowly. Nor is it designed to illustrate geographical principles, or to set forth new facts. It is primarily a book of reference for the Biblical student desirous of obtaining information upon particular events. As such it is most valuable, for its convenient size and careful arrangement under paragraph headings, agree with its pleasant style in making it easy to use. ELLSWORTH HUNTINGTON.

Bibelatlas in 20 Haupt- und 28 Nebenkarten. Von Hermann Guthe. Mit einem Verzeichnis der alten und neuen Ortsnamen. H. Wagner & E. Debes, Leipzig, 1911. Mk. 12. 17½ x 12.

The author is admirably fitted as a biblical historian and archæologist for the important task which he has here undertaken. He has also utilized the results of the explorations of Dr. Schumacher and Prof. Brünnow east of the Jordan, and especially those of Prof. Musil in hitherto unexplored territory lying to the south of Palestine. The new English map of the Sinaitic Peninsula has also made it possible to substitute scientific facts for the conjectures which have hitherto prevailed regarding much of this region. Biblical geography is here defined broadly so as to include not only Syria, Babylonia, and Egypt, but also practically all of the lands mentioned in the biblical narrative.

The series of historical maps cover a period of a millenium and a half, beginning with 1400 B. C. A valuable map of modern Palestine is also added. A good topographical map, however, would have greatly enhanced the value of the series. Of more doubtful value is Plate 6, in which the practically impossible attempt is made to identify all the places and races named in Genesis Chapter 10. It suggests, however, the geographical outlook of the Hebrews at the two periods represented by the early prophetic and the late priestly documents. The color scheme adopted is, in general, excellent. The tendency, frequently observable in German-made maps, to introduce vivid and often inharmonious colors has been avoided, except in Plates 2 and 19.

An excellent reserve is also manifest in tabulating doubtful identifications. The identification of Capernaum with the site at Tel Hum is beyond reasonable doubt. The identification of Adullam, David's place of refuge during his outlaw period, with Tel-el-Mije is so well-assured that the question mark might well have been omitted. On Plate 2, Jabesh in Gilead is placed with a question mark on Wady Jabis, in the western headlands of Moab near the Jordan, while in Plate 3 it appears nearly in the heart of upper Gilead, and north of Mahne. The series, however, is remarkably free from this type of error. Tirzah, the temporary capital of northern Israel, is left unidentified, although its site is represented beyond reasonable doubt by the mounds north of Ain Farah. This compendious and carefully prepared atlas is well adapted to the needs of historical and theological students. CHARLES F. KENT.

China, Social and Economic Conditions. iv and 187 pp. Index. *Annals of Amer. Acad of Political and Social Science,* Vol. 39, Jan., 1912. Philadelphia. $1. 10 x 6½.

The Academy has pursued its wonted careful method in the preparation of this brochure, whose importance is by no means suggested in its painfully quiet exterior. We have here sixteen able essays on as many themes of permanent interest in Chinese life. The authors, so far as their names are known in Occidental life, are recognized in their several specialities as those who may properly speak with authority. Not the least interest will attach to five papers by as many Chinese, each developed by our university system. It is quite clear that here we have the fresh voice of new China; and it is equally clear that these progressives intend to proceed with the most earnest conservation of that solid, moral nature which has kept China a nation during all the ages when barbarians have come into gilded empires and have crumbled into nothingness while China has been China throughout. WILLIAM CHURCHILL.

The Chinese at Home or the Man of Tong and His Land. By J. Dyer Ball. xii and 370 pp. Ills., index. Fleming H. Revell Co., New York, 1912. $2. 8½ x 5½.

China in Transformation. By Archibald R. Colquhoun. Revised and enlarged. vi and 298 pp. Maps. Harper & Brothers, New York, 1912. $1.50. 8 x 5½.

It was quite naturally to be expected that the movement of events in the Middle Kingdom should lead to the manufacture of many books on China. It has acquired a timeliness of news value, and publishers of books are just as subject to the influence of news as are the editors of the periodical press. The two volumes here joined for notice are essentially the result of this motive. Mr. Colquhoun's book has been on the market before; this is the old material brought up to date. From motives of book manufacture this has been somewhat hurriedly done, but for the most part the new material has been cleverly dovetailed into the old, as was to be expected of a writer with this author's facility. A more serious complaint is that the new material is not conclusive; yet it would be too much to expect to find a statement of conclusions when the events of new China are yet far from any conclusion.

A quality of Mr. Ball's book is established by himself in a succession of chapter headings, no less than sixteen of twenty-seven chapters involve the use of the designation "John Chinaman." This is not intended to be insulting; one feels rather that the author is trying to show himself cordial, and he tries to feel in sympathy with the Chinese. After all he has spent years in China, he knows Chinamen and in his clumsy way he likes them. But he is wholly lacking in the feeling of respect which China must deserve from thinking men and students of the philosophy of civilization, and his record, while entertaining and at times instructive, deals most largely with the trivial things of life rather because they amuse, since they are not Occidental, than because of any thought that even in these trivial things inspired research might find matter of great moment. WILLIAM CHURCHILL.

Durch Armenien, eine Wanderung, und der Zug Xenophons bis zum Schwarzen Meere, eine Militär-Geographische Studie. Von E. v. Hoffmeister. viii and 252 pp. Ills., maps. B. G. Teubner, Leipzig, 1911. Mk. 8. 10 x 7.

Earlier books have shown Gen. von Hoffmeister a most enthusiastic wanderer, keen in his interest at every step of the way, filled with the happy confidence that what has attracted his attention will serve to stimulate the pleasure of his reader. Armenia, with its ancient culture, is no longer the field for the pathfinder and the pathmaker. What we ask now of each new visitor to the mountain empire is that he shall pick up wayside detail with which we shall add intimacy to the basic knowledge we already possess. That is the scope of Gen. von Hoffmeister's very readable account of his trip through Armenia. So much for the former two-thirds of the volume, a chatty narrative of surface observation, abundantly illustrated with excellent half-tone pictures.

Then comes matter of another sort, the final third of the volume, not a picture to break its pages, the serious style, a monograph of worthy research on the retreat of the Ten Thousand, Xenophon's less known "Katabasis." This is a review by the trained military intelligence of a problem wholly military. Following the route of the Greek mercenaries after the defeat of Cyrus this lieutenant general of the armies of a great empire has made a close examination of the logistics of that wonderful retreat. He is sympathetic with the problems of the morale of condottieri under defeat, and his study of the rise of Xenophon from the position of a cadet volunteer to the iron command of a mob from which discipline had departed is one of the most brilliant comments which we have read upon this incident of history. The Anabasis, unfortunately, has been given over to kindergarten Greek in our scheme of education. This monograph by Gen. von Hoffmeister should serve to remind us that Xenophon wrote one of the great texts of the art of war, one that should carry lessons of particular value to such political units as the English speaking countries where reliance for defence is placed upon the levies of volunteers lacking in that morale which makes the smaller body of seasoned troops far more effective.

William Churchill.

AUSTRALASIA AND POLYNESIA

Ein Beitrag zur Kenntnis der Tuamotu-Inseln. Von Dr. Georg Friederici. 80 pp. Maps, ills. Leipzig, 1911.

This modest but highly valuable paper is one of the progress reports of the Hanseatische Südsee Expedition of 1909. The author has already published a brief yet interesting account of the Beach-la-mar jargon of the western Pacific. He promises without delay a more general report upon that region. The object of the expedition was the commercial exploitation of these undeveloped islands of the remote sea, an excellent example of the correlation of geographical science and business concerns.

In this volume the author records in detail his observations in the Tuamotu Archipelago, thus preserving the vivid value of field notes of a reconnaissance report; and at the end he sums up in broader conspectus his determinations as to certain problems of geotectonics and ethnology which have hitherto been but imperfectly examined. It will be found of advantage to list the particular atolls upon which his investigations were conducted. These are: Anaa, Haraiki, Makatea, Manuhangi, Maria, Mururoa, Niau, Reitoru, Taiaro, Tematangi, and Tikei.

It is very interesting to note that Dr. Friederici studied the atoll formation in the light of the researches of Darwin and Dana. His notes show that in several important particulars he was unable to reconcile matters of his own observation with either of these theories of explanation. Upon his return within the reach of library facilities he found the more recent studies of Agassiz and is led to give his adhesion most consistently to the work of this later student, though he is obliged to record that it does not completely explain all the observed conditions.

The question of geographical nomenclature has received careful attention in connection with each of the eleven atolls visited. He settles priority of discovery and deals intelligently with the disputed identification of the Sagittaria of Quiros. It is clear that this cannot be Tahiti. It is equally clear that it is not to be confounded with the Conversion de San Pablo of the same mariner, and that the latter is most probably Anaa. Dr. Friederici seems not to have ascertained one most interesting fact which bears with great force upon the discoverability of this atoll. It lies upon the sea with scarcely more elevation than driftwood, in fact on near approach to its reef the land is hidden behind the waves of its breakers; yet, through a rare physical combination of the "atoll cloud" and the reflection from the lagoon water, Anaa affords to the navigator a sky mark as effective as would be the case were the island a mile or more in height.

In discussing the questions of the ethnology of the archipelago the author calls particular attention to the fact that there is a double mixture. A part of the group has strong affiliations with Tahiti, the southern part is affiliated with Mangareva. In this Dr. Friederici anticipates the conclusions which with greater opportunity for detailed statement I am now elaborating in the study of the philological problems of this province of Southeast Polynesia. His treatment of the problem of Melanesian traces in the Tuamotu is both simple and convincing. Altogether, this little volume is the most valuable of all the works dealing with this ultimate attainment of the great migration movement of the Polynesian race. William Churchill.

EUROPE

Transportation in Europe. By Logan G. McPherson. vi and 285 pp. Map. Henry Holt & Co., New York, 1910. $1.50. 7½ x 5.

During recent years the author has published two informing books on "The Working of the Railroads," and "Railroad Freight Rates." In the same clear, forceful style he here presents the salient facts concerning the transportation systems of Europe.

In his introduction he points out that the United States should be compared with all Europe, and not with single countries; that our need for railroads is much greater than Europe's because of our lack of peninsulas and inland seas and of improved inland waterways; and that our industrial status is such as to encourage great transportation enterprises.

Two chapters recount the history, cost of construction, and maintenance, ownership and administration of the roads, canals and railroads of Europe, country by country. The occurrence of three or four classes of passenger rates is explained as a consequence of social classes and not an adjustment to purses. The chapter on "International Rail Traffic" shows how traffix and rates have been adjusted to physical and political barriers. In this chapter, as in others, comparisons with American conditions add greatly to the comprehension of the problems.

Discussing the comparative usefulness of inland waterways and railroads, the author says the waterways have not increased in mileage in thirty years, while the railroads have about doubled. Railroads can operate all the year; waterways are inactive in frozen winter and in dry summer. Railroads pay heavy taxes to the governments and supply millions of dollars worth of free transporting for them; water craft pay small tolls on artificial waterways, but nothing on natural routes, and they never render any government aid. Railroads are limited in their rates for traffic, but water craft may charge what the traffic will bear. The government favors the waterways. In spite of all these advantages, waterways and water craft are continually losing ground in Europe. All concede that European railroad traffic is not so good as American. A long closing chapter is devoted to transportation in England. G. D. Hubbard.

Géologie du Bassin de Paris. Par Paul Lemoine. ii and 408 pp. Maps, ills., bibl., index. A. Hermann & Fils, Paris, 1911. 15 frs. 10½ x 7.

The Basin of Paris is classic ground in geology, because it is the first region of Europe which underwent scientific examination through such scholars as Alexander Brogniart, Cuvier, Lamarck and Deshayes. While the first named examined the ground geologically, Cuvier, Lamarck and Deshayes made the first researches of the vertebrate remains and of the moluscan fauna of the territory. The basin is a syncline, in which, after the Triassic period sedimentation set in and continued to the Tertiary. The latter is characterized by three stages: Bartonien (upper Eocene), Lutétien (middle Eocene) and Yprésien (lower Eocene). The formations consist of fossiliferous sands, sandstones and limestone. The gypsum of Montmartre formerly classified in the upper Eocene, is now referred to the Oligocene. The shales above the gypsum with *Linnæus strigasus,* the so-called *Marnes supragypseuses,* as well as the Cyrene-marls with *Cyr. convexa, Cerith. plicatum,* etc., and the fresh-water lime of the Brie with *Planorbis, Linnæus,* etc., are now placed in the lower Oligocene.

Beginning in middle Oligocene time, the Paris Basin was again overflowed by the sea, which extended in that period even farther south than during the Eocene. Near Paris the so-called "oyster shales" ("marnes à huîtres") were formed, with *Ostrea cyathula,* etc. To the upper Oligocene finally belong the millstone ("meulières") of Villers-Catterets, Montmorency, etc., and the lime of the Beauce, both fresh water formations, with numerous species of *Linnæus, Planorbis, Paludina,* etc., and remains of *Anthracotherium, Aceratherium,* etc. The remains of *Palaeotherium magnum* and *medium, Anaplotherium commune, Xiphodon,* etc., first described by Cuvier, are, however, found in the main strata of the Paris gypsum.

The treatise by Lemoine gives a complete history of the Paris Basin, geologically as well as paleontologically. A general introduction will help those who are not familiar with the technical terms to understand the larger part of the rocks. Numerous illustrations and maps elucidate the text.

CHARLES L. HENNING.

OTHER BOOKS RECEIVED

NORTH AMERICA

RECOLLECTIONS OF ELIZABETH BENTON FRÉMONT, daughter of the Pathfinder General John C. Frémont and Jesse Benton Frémont his wife. Compiled by I. T. Martin. 184 pp. Ills. Frederick H. Hitchcock, New York, 1912. $1.25. 7½ x 5. [Reminiscences which impart the human touch to many of the important events that occurred between the Atlantic and Pacific Seaboards during the latter half of the Nineteenth century.]

MAMMOTH CAVE OF KENTUCKY. With an Account of the Colossal Cavern. Revised Edition. By Horace Carter Hovey. iv and 131 pp. Maps, ills. John P. Morton & Co., Louisville, 1912. $1. 8½ x 6. [The standard history and description of Mammoth Cave.]

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NEW MAPS*

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

NORTH AMERICA. Map of North America. 1: 10,000,000. 84° - 6° N.; 180° - 10° W. With two insets: (1) [Aleutian Islands] 55°48′ - 50° N.; 172° E. 162°36′ W. (2) [Windward Islands] 19° - 8° N.; 67° - 59° W. 1912. [A useful base map reduced from the 1: 5,000,000 map compiled by the same bureau. State and international boundaries shown. Extreme northeastern coast-line of Greenland omitted.]

Maps Accompanying Publications

MAINE. Map of Maine showing Penobscot Drainage Basin. 1: 1,000,000. 47°30′ - 43° N.; 71°18′ - 66°42′ W. 4 symbols. Accompanies, facing p. 8, "Water Resources of the Penobscot River Basin, Me." by H. K. Barrows and C. C. Babb. Water-Supply Paper 279. 1912. [Shows drainage boundaries with river and lake surveys.]

MONTANA. (a) Geologic Map of Region surrounding the Butte District. 1: 250,000. 46°37′ - 45°45′ N.; 112°42′ - 111°56′ W. 13 colors. 1912. (b) Geologic and Vein Map of Butte, Montana. 1: 15,000. 46°02′54″ - 45°59′28″ N.; 112°36′42″ - 112°29′30″ W. 7 colors. 1912. Pls. I–X, "Geology and Ore Deposits of Butte District, Montana," by W. H. Weed. *Prof. Paper* No. 74, 1912.

UTAH. (a) Topographic Map of Park City District, Utah, with index showing position of mines. 1: 25,000, 40°39′ - 40°35′ N.; 111°34′ - 111°26′ W. (b) Geologic Map of the Park City District, Utah. 1: 25,000. 40°39′ - 40°35′ N.; 111°34′ - 111°26′ W. 16 colors. (c) Geologic Map of Central portion of Park City District, Utah. 1: 12,000. 40°38′ - 40°36′30″ N.; 111°31′30″ - 111°29′30″ W. 13 colors. Pls. I–XXXIX "Geology and Ore Deposits of the Park City District, Utah," by John Mason Boutwell, *Prof. Paper* No. 77. 1912.

U. S. COAST AND GEODETIC SURVEY

Atlantic Coast

Cape Neddick Harbor to York River, Maine. 1: 20,000. 43°11′42″ - 43°07′00″ N.; 70°39′48″ - 70°34′00″ W. Chart No. 228. May 1912. 25 cts.

Gulf Coast

Sand Key to Rebecca Shoal. 1: 80,000. 24°50′ - 24°17′ N.; 82°40′ - 81°52′ W. Chart No. 1252. July 1912. 50 cts.

Pacific Coast

San Francisco to Point Arena. California. [Mercator's projection: mean meridional scale 1: 200,000.] 38°59′ - 37°32′ N.; 124°35′ - 122°13′ W. Chart No. 5502. June 1912. 50 cts.

GENERAL LAND OFFICE

UNITED STATES. [4 State maps, 1: 760,320, viz:] (a) State of Florida. 1911. (b) State of Illinois. 1911. (c) State of Missouri. 1911. (d) State of New Mexico. 1912. [These standard maps belong to the series of public-lands state-maps compiled from the official records of the G. L. O. Land District Boundaries, Forests, Indian and Military reserves, etc., shown. Relief in brown shading.]

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* Prepared by L. Dominian in the absence of the Assistant Editor.

NORTH AMERICA

North America. Stanford's Library Map of North America. In 4 sheets. 1:5,274,720. 18 colors. With one inset: Aleutian Islands and continuation of Alaska Peninsula. 1:5,274,720. 58° - 50° N.; 178° 30′ - 159° W. 1 color. E. Stanford. London. 1912. Price 35 sh. [An up-to-date edition of this general reference map. Canadian provincial boundaries with changes in Manitoba and Quebec shown. Also state lines in the United States and Mexico. Barring representation of land relief, the execution is good.]

United States—Mexico. Map of Southwestern Arizona and Northwestern Sonora, comprising the region formerly called Papagueria. 1:754,000. 33°24′ - 29°18′ N.; 115°12′ - 110°36′ W. 2 colors. With two insets: (a) The Pinacate Region. 1:50,700. 31°45′ N.; 113°30′ W. (b) Sketch map of the United States and Mexico [showing location of main map]. Accompanies "New Trails in Mexico" by C. Lumholtz. Charles Scribner's Sons, New York, 1912. [Important revision of this region based on the author's original surveys. Trails, wells and villages indicated. Course of Sonoita river located farther south than on other maps. Extreme N. E. coast-line of the Gulf of California redrawn. Indentations on northern shore of Bahia de Adair mapped. Native names of the ranges trending N–S given. Area covered by sand dunes south of Yuma desert shown. Notes on the vegetation of the northern section of the Altar district inserted locally.]

Canada

Alberta. [2 maps showing disposition of lands, 1:792,000, viz:] (a) Northern Alberta. 60°12′ - 52°55′ N.; 121° - 110°50′ W. 10 colors and 2 symbols. With one inset. [Peace River Block.] 1:792,000. 56°42′ - 55°30′ N.; 122° - 120°12′ W. 1 color. (b) Alberta, Southern. 55°25′ - 48°50′ N.; 119°36′ - 109°20′ W. 9 colors and 3 symbols. Railway Lands Branch, Dept. of the Interior, Ottawa. 1912.

British Columbia. Map of Vancouver Island and adjacent Islands. 1:253,440. 51° - 48° N.; 129°12′ - 122° W. 2 colors. T. N. Hibben & Co. Victoria, B. C. 1910. [A valuable land map. Timber and coal licenses shown. Also lots, sections, blocks, Indian Reserves, etc.]

Mexico

Chihuahua. Map of the State of Chihuahua. 1:1,000,000. 32°26′ - 24°36′ N.; 109°30′ - 102°30′ W. 1 color. H. A. Horsfall, New York. 1911. Price $5.00. [Map based on private surveys made by engineers. Valuable as regards wagon roads and trails. Mining districts shown.]

Central America

Central America. Mapa de America Central. 1:1,000,000. 17°50′ - 7° N.; 92°30′ - 79°20′ W. 13 symbols. With one inset: Map of Canal Zone, 1:250,000. W. C. Rübsamen, Stuttgart. [1911.] Price $10. [A well-executed wall-map of this region. Compiled from U. S. and C. A. government maps. Relief in two shades of brown for elevation above and below 100 mts. Heights in meters. International boundaries shown as contended or definite. Also administrative subdivisions. Thorough as regards roads and railroads. Coastline accurate but some river courses will need revision as surveys are advanced. Steamship connections and wireless stations indicated, as well as location of mining districts. Text in English and Spanish. Accompanied by explanatory pamphlet in English, Spanish, German and French.]

Costa Rica. Mapa de Costa Rica. 1:500,000. 12°40′ - 8° N.; 86° - 83°46′ W. 10 colors and 15 symbols. With one inset: [Coco Island 1:500,000] 5°30′ N.; 87° W. 5 colors. Taf. I. "Kostarica, Beitrage zur Orographie und Hydrographie," by H. F. Pittier Ergänzungsheft No. 175 zu Pet. Mitt. 1912. [Primarily a physical map compiled from foreign and national official data. Hypsometry shown by contours at irregular intervals and 10 shades of brown. Altitude in meters. Railroad lines divided in unit spaces of 1 km. Roads and new trails plotted. Panama boundary line indicated both where definitely settled and contended.]

SOUTH AMERICA

Surinam. Suriname. De Corantijn. 1:500,000. 5°5′ - 1°45′ N.; 58°5′ - 56° W. 2 colors and 6 symbols. With one inset: Overzichtskaarte van Suriname. 1:3,000,000. 6° - 1°40′ N.; 58°10′ - 53°40′ W. 2 colors. Kaart III "Verslag der Corantijn Expeditie (19 Juli 1910–1 April 1911)" by C. C. Kayser. Tijds. van het K. N. Aardrijks. Gen. Vol. XXIX, No. 4, July 15, 1912. pp. 442-515. [Shows expedition's route in this ill-known region. New latitude and longitude determinations and barometric heights. Native trails in blue. Party's route in red. Relief in brown hachures. Same color shading when height determinations insufficient.]

Peru. Railway and Mining Map of Peru. 1:6,000,000. 1° - 19° S.; 82° - 67° W. 13 symbols. Supplement, facing p. 85, "Peru To-day" Vol. IV, No. 2, May 1912. [Sketch map showing distribution of mineral deposits and railways operated, in construction, surveyed or proposed.]

Bolivia. Mapa demostrativo del desarollo de los Ferrocarriles en Bolivia. 1:5,000,000. 9°30′ - 25°30′ S.; 72°30′ - 57° W. 5 symbols. Accompanies, facing inside rear cover, *Boletin de la Oficina Nacional de Estadistica* Nos. 70, 71 y 72, 1911. La Paz. 1912. [Sketch-map showing railroads in operation, in construction, surveyed and projected. With statistical data on distances.]

AFRICA

French Western Africa. Carte du Ouadaï. 1:1,000,000. 15°50′ - 10°50′ N.; 18°58′ - 23°25′ E. With one inset showing location of main map. Serv. Géogr. des Col., Paris. 1911. [Preliminary orography with approximate contours. Swamps and wells shown.]

Basutoland. Basutoland 1:250,000. In 4 sheets. 2 colors and 29 symbols. (1) N. W. Sheet. 28°30′ - 29°35′ S.; 27° - 28°15′ E. (2) S. W. Sheet. 29°35′ - 30°40′ S.; 27° - 28°15′ E. (3) N. E. Sheet. 28°30′ - 29°35′ S.; 28°15′ - 29°30′ E. (4) S. E. Sheet. 29°35′ - 30°40′ S.; 28°15′ - 29°30′ E. Geogr. Sec. of the Gen. Staff, London. 1911. [Abounds in topographic detail.]

ASIA

China. Production Map of China. 1:5,000,000. 45° - 17°30′ N.; 93° - 125° E. 7 symbols. Accompanies, facing p. 59, "Returns of Trade and Trade Reports. 1911." China. The Maritime Customs. I. Stat. Ser. Nos. 3 and 4. Shanghai 1912. [Shows distribution of natural resources.]

Turkey in Asia. Asia Minor. The Troad after Kiepert and Philippson with corrections by Walter Leaf. (a) 1:600,000. 40°31′ - 39°17′ N.; 25°53′ - 27°43′ E. 1 color. (2) 1:300,000. 39°55′ - 39°29′ N.; 26°46′ - 27°9′ E. 1 color. Accompanies "Notes on the Troad" by W. Leaf. *Geogr. Jour.* Vol. 40, No. 1, 1912, pp. 25-45. [Corrections in the topography of the region environing Mt. Ida.]

AUSTRALASIA

Australia. Rain map of Australia for the year 1910. [1:9,000,000.] 2 colors. [Central Weather Bureau, Melbourne] 1911.

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EUROPE

Great Britain. Electric Railways of London. 1:15,840. 2 colors and 8 symbols. Cook & Hammond, London. [1912]. [The relation between the subject illustrated and the regional element is admirably set forth. Railways operated, in construction and authorized shown. Also those proposed for session 1912.]

FRANCE. Environs de Paris dans un rayon de 30 Kilomètres. 1:66,666. 49°5′15″ - 48°37′45″ N.; 1°53′2″ - 2°46′22″ E. 4 colors and 18 symbols. H. Barrère. Paris. 1911. [A detail map. Its accuracy insures its value as a guide map. Roads and paths, woods, hamlets, buildings, farms, forts, etc.]

RUMANIA. Planul Orásului Bucuresti. [1:10,000]. 2 colors. Socec & Co. Bucarest. 1911. Price 2.50 lei. [Usual type of city maps.]

WORLD AND LARGER PARTS

WORLD. (a) Coaling Stations of the World. [1:48,000,000]. (b) Trade Routes and Distances by existing lines and by the Panama Canal. [1:38,000,000]. Accompany "Panama Canal Traffic and Tolls." Preliminary Statement by E. R. Johnson. *U. S. Sen. Doc. 575.* Gov. Prin. Off. Washington, D. C. 1912.

ATLASES

ATLAS UNIVERSEL DE GÉOGRAPHIE. Ouvrage commencé par L. Vivien de St. Martin et continué par Fr. Schrader. 90 sheets. Librairie Hachette et Cie. 1912.

This Atlas is finally completed after a half century. It was begun about 1862 by St. Martin. Since 1880 the work has been carried on by Schrader. The period covering its publication is that in which scientific geography went through the formative stage. It was also an era of active exploration that yielded a rich harvest of data to the cartographer who was enabled thereby gradually to fill the blank spaces marking unknown regions. The 90 sheets show that the publishers have availed themselves to the fullest extent of the contributions to their work afforded by this twofold progress.

The sheets given to America have been based almost exclusively on surveys undertaken by Federal or State bureaus. For the United States and Canada the maps consulted practically cover the entire cartographic output of both governments since the organization of their respective topographic bureaus. The map of North America is a reduction of the various sheets that were prepared for this continent. The equidistant zenithal projection assuring a minimum of deformation in the change from the spherical to the plane surface was adopted

Special attention was bestowed on the less known portions of Northern Africa. The map of Morocco, one of the sheets recently issued, is based on the second edition (1904) of M. R. de Flotte de Roquevaire's 1:1,000,000 map to which corrections suggested by Louis Gentil's surveys were added. The term Anti-Atlas was restricted to the southwesterly chain diverging from the main uplift at the Siruaa massif and extending to the Atlantic Coast near Cape Nun.

The northwestern coast line of Africa may have to be revised in the light of the astronomical and geodetic observations made by Lieut. Dyé and Messrs. Larras and Pobéguin subsequent to the French military intervention. The harbor of Mogador lies about 4 kms. further west than is shown, the correlated inland points being similarly affected. On the South African sheet the boundaries of the different colonies have been based on maps published by official surveys. Their location conforms with the text of the treaties and delimitation conventions.

Most of the Asiatic sheets are fortunately among the latest published. The one showing Tibet and N. E. India has been compiled primarily from the 1:253,440 Indian atlas and 1:1,000,000 map of India and adjacent countries. Russian military maps were also consulted. Information obtained by explorations in the first decade of the present century has also been incorporated.

A wide range of cartographic literature has also been used in the preparation of the map of China. To avoid overcrowding the terminal syllable of the names of Chinese towns used to indicate their size or rank has been omitted. Restitution of this suffix is rendered easy by observation of the type. The ending *Fu* is required at the end of names written in capitals. *Tcheou* or *Ting* is the terminal syllable of those in Roman type while names in italics should end with *Hien.*

Much praise is due the editors for the execution itself. The atlas takes a leading place among the best products of modern cartographic art. The fineness of line obtainable on copper plate engravings has permitted the introduction of details that could not otherwise have been denoted. At the same time there is no crowding of the sheets with information that is not required by the scale. The legibility of the text is occasionally blurred in regions of high uplift owing mainly to the omission of color. Aside from this, each sheet reveals to the trained eye the great care with which it has been prepared. The atlas is not merely intended for the layman's use. Its place is much rather in the scholar's library.

PHILIPS' CHAMBER OF COMMERCE ATLAS. A Graphic Survey of the World's Trade with a Commercial Compendium and Gazetteer Index. viii and 128 pp. 144 pp. George Philip & Son, Ltd., London, 1912. 6s. 10 x 7. [This atlas is a concise résumé of commercial geography. The general features of the world's trade, the markets of the world, the sources of supply of the principal commodities, and the world's natural resources are depicted. In addition it contains information on the chief articles of international commerce. These features should recommend the work for a business man's library.]

RAND, McNALLY & CO.'S NEW IMPERIAL ATLAS OF THE WORLD. 193 pp. Index. Rand, McNally & Co., New York, 1911. 14½ x 11½. [The new edition differs little from the preceding. There is room for much improvement in its execution. The work contains demographic information which renders it particularly valuable.]

PRATT'S ROAD ATLAS OF ENGLAND AND WALES. 106 pp. Anglo-American Oil Co., Ltd., London, 1912. 2s. 6d. 8½ x 5. [A good road map. Hypsometry differentiated by color. Heights of towns and highest points on roads shown. A number of road profiles given.]

A NEW SCHOOL ATLAS OF MODERN HISTORY. A series of 48 Plates, containing 120 Coloured Maps & Diagrams, with an Introduction illustrated by 29 Maps and Plans in black and white. By Ramsay Muir. xxiv and 48 pp. George Philip & Son, Ltd. London, 1911. 3s. 11 x 9. [A commendable feature is the emphasis placed on the physical basis of historical geography. In most cases relief and hydrography are shown along with historical features. The introduction contains a commentary for each map. The execution is particularly good as regards text which contains only names referring to the special features shown on each map.]

A SCHOOL ATLAS OF ENGLISH HISTORY. Edited by Samuel Rawson Gardiner. 88 pp. Index. Longmans, Green & Co., New York, 1910. 8½ x 7. [This Atlas may be used as a companion to the "Student's History of England." It covers the period intervening between Roman Britain about 400 A. D. and the Siege of Sevastapol. A number of battle-field sketches accompany the maps.]

ATLAS CLASSIQUE. FRANCE AND COLONIES. CARTES GÉOLOGIQUES, PHYSIQUES, HYPSOMÉTRIQUES ET POLITIQUES. Par Schrader et Gallouédec. 29 maps and 19 notices. Deuxième Édition Revue. Hachette et Cie, Paris, 1912. Fr. 2.50. 13 x 9. [Specially intended to accompany courses in geography and history as taught in French "Lycées." The regional maps of France are based on the geological structure of the country. A short comment accompanying each map serves to emphasize regional influences on the life of man.]

JUSTUS PERTHES' TASCHEN-ATLAS. 49. Auflage. Vollständig neu bearbeitet von Hermann Habenicht. 24 kolorierte Karten in Kupferstich. Mit geographisch-statistichen Notizen. Von Hugo Wichmann. 80 pp. Justus Perthes, Gotha, 1912. Mk. 2.40. 7 x 4. [Contains 80 pages of geographic notes systematically presented. The 24 small maps constituting the atlas are of the usual high order of execution for which the publishers are famous.]

PEIP'S TASCHENATLAS VON BERLIN UND WEITERER UMGEBUNG. Vierte gänzlich umgearbeitete Auflage. xviii and 163 pp. Paasche & Luz, Stuttgart, 1912. Kk. 2.50. 7½ x 4½. [A handy guide to the environs of Berlin roughly in a radius of 50 kms. The excellence of the execution practically precludes the necessity of text. Descriptive notes of local interest accompany the large scale maps.]

BULLETIN

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THE PENINSULA OF YUCATAN

BY

ELLSWORTH HUNTINGTON

The flat peninsula of Yucatan, projecting northward like a thumb at the southern entrance of the Gulf of Mexico, is full of problems for the geographer. Some of these, such as the numerous "cenotes," or caverns which contain the only natural sources of permanent water, have been well described in the *Bulletin* and elsewhere. Others, such as the peculiar "storms" of minute earthquakes which at times shake the peninsula for days, are not yet understood nor are they widely known. And still others, such as the cause of the location in this region of the highest civilization which ever developed in America before the coming of Columbus, have been discussed for years, but have never been satisfactorily explained. A visit of two weeks to the peninsula during a journey to Mexico, on behalf of the Carnegie Institution of Washington in the spring of 1912, introduced the author to some of the chief problems, and has led him to write this paper for the purpose of briefly calling attention to them, without trying to describe the country as a whole, or to enter into elaborate discussions.

The position of Yucatan with respect to the rest of the world is highly isolated. Toward the south and east it is bounded by dense tropical forests which even in our day are penetrated neither by railway nor road. They can be traversed only along Indian trails, winding and crooked, and often coming blindly to an end. Even these poor apologies for paths are impassable except with the help of a party of natives armed with big machetes for cutting the young trees and lianas, which grow with astounding rapidity. The inhabitants of the forests are limited to a few scattered bands of Indians in the lowest stages of civilization. Often the traveler may go for days without seeing a village or even a camp. On the north, east and west Yucatan is surrounded by water, but that does not make it accessible. The harbors on the east coast are said to be fairly good, but the country back of them is covered with dense forests like those on the south, and hence they are almost useless as means of getting at the important portions of the country. On the north the coast is bordered by an almost continuous line of sand bars and lagoons. Within the lagoons the water is quiet and small boats can sail easily, but unfortunately it is not possible to go any great distance without meeting barriers which force the navigator to take to the open sea. There the waves raised by the prevailing trade winds blowing freshly from the northeast are so high as to make long voyages too dangerous to be commonly undertaken. As far as modern steamers are concerned conditions are no better. Like all newly uplifted coastal plains Yucatan is bordered by very shallow seas. The steamers of

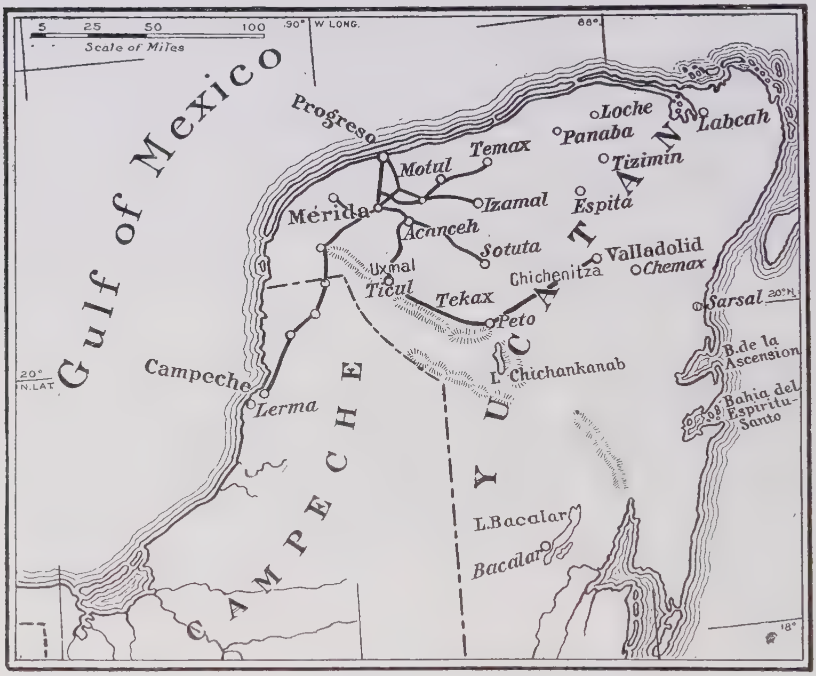

FIG. 1—Yucatan.

the Ward Line, the only one plying regularly to the country, are forced to anchor three miles or more from land, and to send their freight and passengers ashore in a tug which pitches most disquietingly even in comparatively good weather. In bad weather it is often impossible to make a landing. On the west coast, known as Campeche, conditions are somewhat better because of less exposure to the winds, but the difficulties due to shallow water are not much different. Altogether the peninsula of Yucatan is a decidedly inaccessible region. No great trade routes touch it, its near neighbors on every side are backward, and there is little in its geographical position or in its degree of accessibility to permit of the stimulation which comes by contact with people of other ideas and habits.

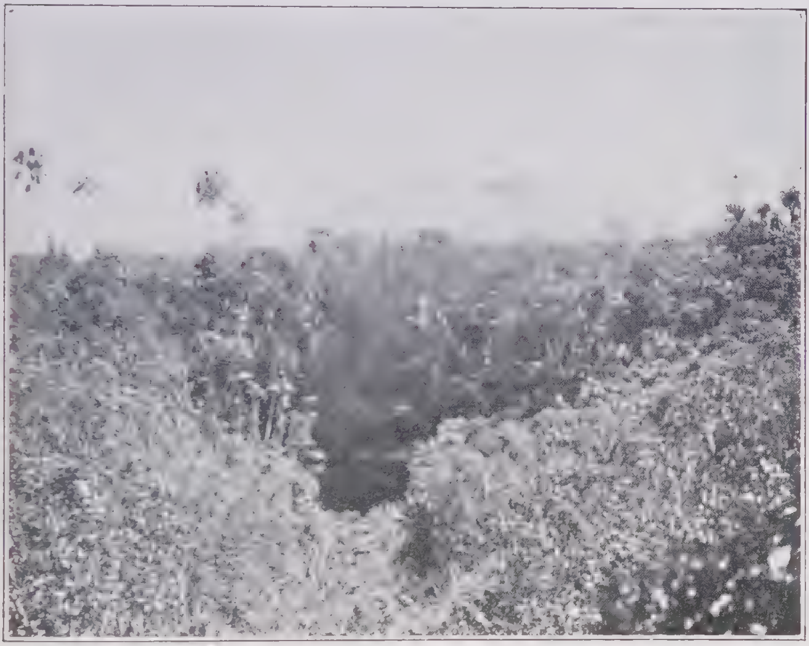

FIG. 2—The mouth of a "cenote."

Physiographically, as has already been implied, the northern part of Yucatan is a coastal plain newly uplifted from the sea. For scores of miles the general aspect of the country is absolutely flat. Near the center, low hills rise to a height of 300 or 400 feet, and farther south the relief becomes greater. The most noticeable ridge, so far as the inhabited portions of the country are concerned, runs southwestward from a point about thirty miles inland from the northwestern corner of the peninsula. Its rounded hills are a prominent feature in the landscape as looked at from the plain to the east, but they are nowhere difficult to cross. Nevertheless they form a genuine barrier to civilization, largely because of their relation to water-supply, rainfall and vegetation.

Practically all of Yucatan is composed of soluble limestone. This has given rise to one of the most widely known features of the country, that is its underground drainage and "cenotes" or caves. The topography is almost universally of the type known as "karst." The karst, however, is not of the kind most commonly known, for in Yucatan we have to deal with a level plain instead of with a region of considerable relief. Because of the flatness of the country and the porous nature of the soluble limestone such a thing as a river is unknown. Not even a brook is found in the whole region, and naturally there are no valleys either. The only break in the flat monotony is afforded by innumerable little hillocks five to fifteen feet high. They lie in no regular order, being merely the remnants which happen to have been left between depressions in which a little water gathers in the rainy season. The water stands in pools for a while, and by so doing tends to dissolve the hollows to a deeper level. Only rarely does the water of one hollow run over into another, and even then not in sufficient amounts to make real running streams. Such being the case, the drainage of the country is naturally confined to underground channels. Often the concealed waters dissolve large caves, whose tops sometimes have fallen in, exposing the water at a depth of anywhere from twenty to a hundred feet, and thus giving rise to the "cenotes." These broken-down caves are of great importance to the inhabitants, for, as has already been said, they are the only places where a permanent supply of water is obtainable naturally throughout the year. At the time of the coming of the Spaniards all the native inhabitants, the Maya Indians, are said to have been clustered around them. Having no iron tools the primitive Mayas were unable to dig wells. To-day wells can be dug almost everywhere with full assurance of striking an abundant and unfailing supply of water. The only difficulty is that in the hilly regions the wells have to be sunk to a depth of from 100 to 200 feet, and the labor involved is sufficient in many cases to prevent the inefficient people of the tropics from making the attempt. Where ground water lies at a depth of only twenty or thirty feet, as in most parts of the plain, wells are numerous. In many cases the water is raised by windmills which seem to rise like a forest when one looks from a distance at such a town as Merida, the capital. During recent years, when Yucatan has grown rich from the henequen or sisal fiber industry, pumps run by gasoline or steam have in many places appeared.

Climatically, as well as in other ways, Yucatan is relatively simple. It lies in the trade wind belt from about 18°10′ to 21°30′ N. In winter the brisk winds from the ocean pass over the land without giving up much moisture. The sky is clear a large part of the time, and although some rain falls in every month the amount in the northern parts is insignificant. Farther south, however, where the hills begin to rise, the rainfall increases rapidly, and showers are quite frequent even in the dry season. The temperature in winter is agreeable, being rarely extremely warm and never cold according to the ideas of people from the north. There is, however, considerable variety, especially when the so-called northers blow. These appear to be connected with the cyclonic storms of the United States. The winds blow violently from the north and reduce the temperature to the lowest points ever reached. The minimum, however, is rarely below 10° C. (50° F.), while the maximum, even in winter is usually above 30° C. (86° F.), and may rise above 40° C. by the end of March. In summer, as might be expected in this latitude, the maximum temperature is scarcely higher than in winter, although the minimum does not fall so low. The zone of subtropical rains exerts its accustomed influence and gives rise to heavy tropical showers. How greatly the summer rainfall exceeds that of winter may be seen from the accompanying table which gives the average monthly rainfall for the 15 years from 1896 to 1910 inclusive at Merida:

MONTH	RAINFALL IN INCHES
January	0.88
February	0.68
March	0.58
April	0.74
May	1.70
June	5.61
July	4.90
August	8.48
September	4.46
October	3.04
November	1.94
December	1.36
Total	34.37

The seasonal variation of rainfall is no more striking than its variation from region to region. In the north the rainfall is slight, being at a minimum on the coast in the neighborhood of Progreso. Here in 1911, the only year for which statistics are at hand, the precipitation amounted to 13.5 inches. From 15 to 20 miles inland, at such places as Merida, or Motul and Temax (Temásh), which lie farther east, the precipitation for the same year was 35.7, 37.6, and 34.8 inches respectively. Still farther inland at places varying from thirty to ninety miles from the coast the figures are: Izamal, forty miles due east of Merida 49.2 inches, Espita, nearly as much again to the east 48.7 inches, Tekax, fifty miles south-south-east of Merida 53.3 inches, and Peto about thirty miles southeast of Tekax, but not so close to the hills, 47.7 inches. Finally to the east and south of the places already mentioned we find an area of still larger rainfall, exemplified by Valladolid, which lies a hundred miles east-southeast of Merida and about fifty miles from the Caribbean Sea, and had a rainfall of 66.8 inches in 1911. Beyond this point, to judge from the vegetation, the precipitation becomes still greater. The cause for the variation in rainfall is two-fold. In the first place the presence of hills in the south and southwest on the one hand, and the proximity of the east coast to the open Caribbean Sea with its moist east winds, on the other, give those regions more rain than has the north coast and northern interior. In the second place we are here

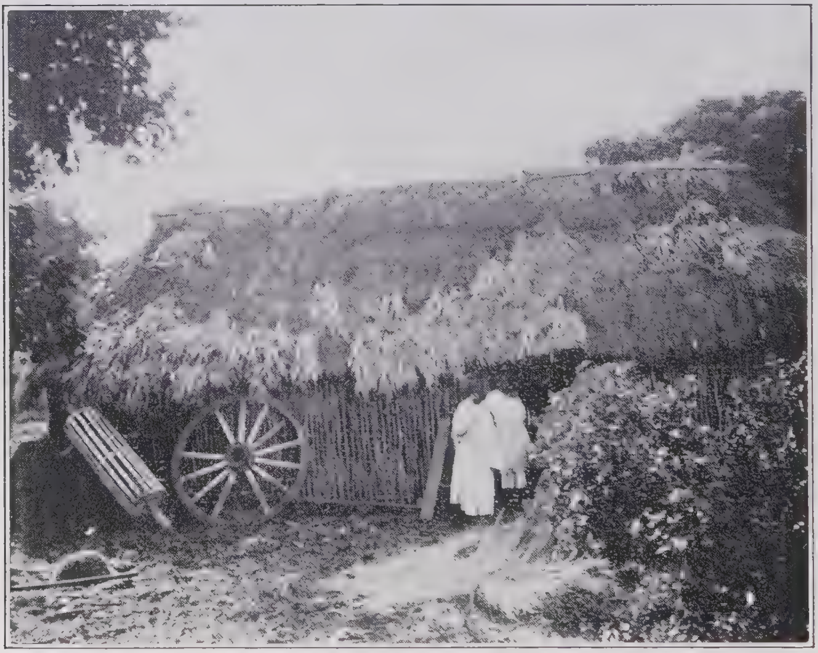

Fig. 3—An Indian hut on the edge of the jungle.

near the edge of the area reached by the zone of subequatorial rains. Hence the amount of these rains increases rapidly toward the equator.

With such marked changes in the amount of rainfall from place to place, it is evident that the vegetation must vary greatly, and this in turn must profoundly affect the conditions of human life. In works on botany it is common to emphasize the distinction between tropical jungle and tropical forest. Nevertheless in the mind of the average geographer, if I may judge from my own experience, and still more in the mind of the layman, the distinction between the two often lacks sharpness. There is a still greater lack of appreciation of the significance of the two in reference to man. In Yucatan jungle and forest lie close together in such a fashion that they can

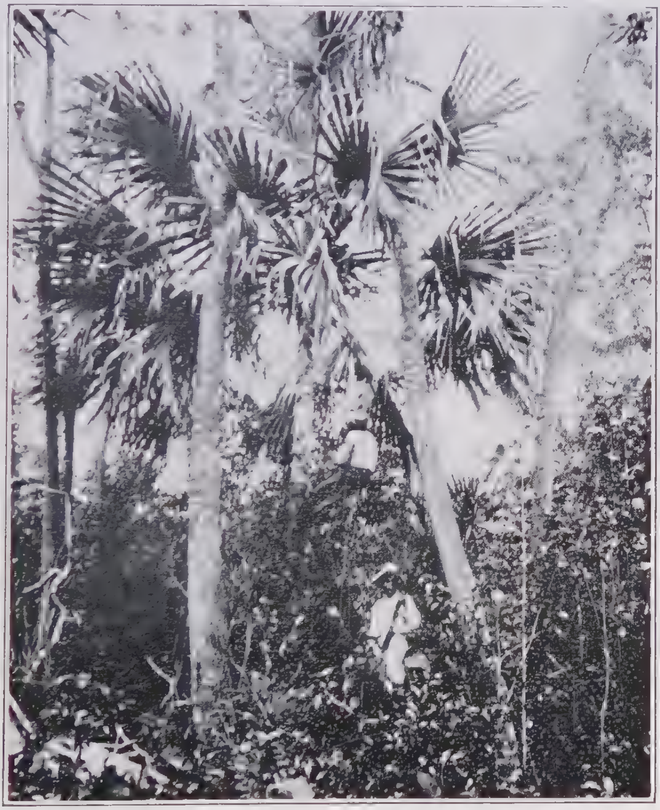

Fig. 4—The tropical forest.

readily be compared. In the center of Yucatan lies a long narrow lake called Chichankanab, one of several which occupy hollows in the limestone of the southerly, more hilly portion of the peninsula. It is about a hundred miles east of Campeche, a hundred west of the Caribbean Sea, and a hundred south of the northern shore of the peninsula. If lines be drawn northeastward and northwestward from the lake to the corners of the peninsula they will include approximately the entire area of the Mexican administrative province of Yucatan, comprising about one-fifth of the whole peninsula. This small area, together with a strip of the west coast reaching down toward Campeche, comprises the jungle-covered portion, while the rest is covered with genuine tropical forest. The western boundary of Yucatan proper is nearly coincident with the small range of hills already mentioned as the most noticeable feature of the relief. The eastern boundary appears to be less distinct, although I have not seen it and cannot speak with assurance. Where jungle prevails the rainfall seems not to exceed fifty inches, while in the forested area it rises far higher. How great it is we do not know, for Valladolid, with nearly 67 inches in 1911, is the only station whose figures I can find, and it lies on the relatively dry edge of the forest, not in its moist interior.

The distinction between jungle and forest is simple. Large trees demand that the soil in which they stand shall not be dry for any great length of time during the growing season. Inasmuch as the growing season lasts almost the entire year in the tropics, large trees will not flourish in such a way as to form dense forests unless abundant rain falls at most seasons, although they may grow sporadically here and there. Smaller, more drought-resistant species, however, as well as bushes, are much less exacting in their demands for moisture. Some of them will grow almost anywhere if the ground is well moistened for two or three months during some portion of the year. In regions like Progreso, where the rainfall is only from ten to fifteen inches and is concentrated largely in the summer, the long dry period of winter prevents the growth of anything except small bushes six or eight feet high. These, however, thrive in abundance so that the country is well covered with vegetation and is everywhere bright green in summer. In the dry winter, however, the leaves fall off and the landscape would be quite like that of a thick bushy pasture in the United States were it not that in March or April some of the bushes bear brilliant red, yellow or white flowers. As one goes inland from the north coast to regions of greater rainfall the size of the bushes gradually increases and small trees appear. Even at the southern limit of jungle, however, at places like Tekax and Peto the diminutive limestone hillocks or the larger hills of the range bordering the administrative province of Yucatan are covered with a low scrubby growth. Some trees rise thirty or forty feet, and many twenty feet. There is nothing, however, to suggest the deep, somber forest. Small growths not over twenty feet high and with stems only three or four inches in diameter predominate. The aspect is like that of a second growth of timber in the northern United States fifteen or twenty years after the cutting of the original forest. A few bushes and even an occasional tree of some special species may remain green throughout the year, but most become as bare as northern trees.

From the jungle to the forest the transition is rapid. A day's ride on horseback is sometimes sufficient to take one from a well developed sample of one to an almost equally well developed sample of the other. The forest is of the kind whose descriptions are so familiar. Many trees remain green throughout the year. The trunks rise to heights of fifty or sixty feet even on the borders of their province, and at the top the leaves form a canopy so that the ground is usually shady. Until 9 or 10 A. M., the rays of the sun, even in the drier months when a portion of the leaves have fallen, scarcely reach the ground. Even at high noon the sunlight straggles through only in small patches. Long, sinuous lianas, often queerly braided, hang down from the trees; epiphytes and various other parasitic growths add their strange greens and reds to the varied complex of plants. Young palms grow up almost in a night, and block a trail which was passable a few days before. Wherever the death of old trees forms an opening, hundreds of seedlings begin a fierce race to reach the light and strangle their competitors. Everywhere the dominant note is intensely vigorous life, rapid growth, and quick decay, as befits the warm moist air which rarely varies and never is so cold or dry as seriously to interfere with the development of the most sensitive types of plants.

Before discussing the effect of the vegetation and of other conditions on man, a word as to the relation of the karst to the vegetation. It is sometimes stated that the paucity, or rather the small size and xerophilous character of the vegetation of northern Yucatan is largely due to the dryness of the soil occasioned by the draining away of the water through the caves and underground channels. Undoubtedly this is an important factor, but I doubt whether it is so important as the rainfall. In no country where the growing season is at all warm can a rainfall of ten or fifteen inches support anything except a xerophilous type of vegetation. In a country so warm as Yucatan thirty or forty inches is by no means a large rainfall, and even if none of it were lost in the karst the country would still be relatively dry because of the great evaporation and long dry season from November or December to May. In the southern half of Yucatan not only on the edges but actually within the limits of the genuine forest, karst phenomena seem to be as marked as near the northern coast, but this does not prevent the growth of the rankest kind of vegetation. It seems, therefore, that while the karsted character of the country plays a part in limiting the growth of vegetation, it is by no means so important as the relatively small amount of precipitation.

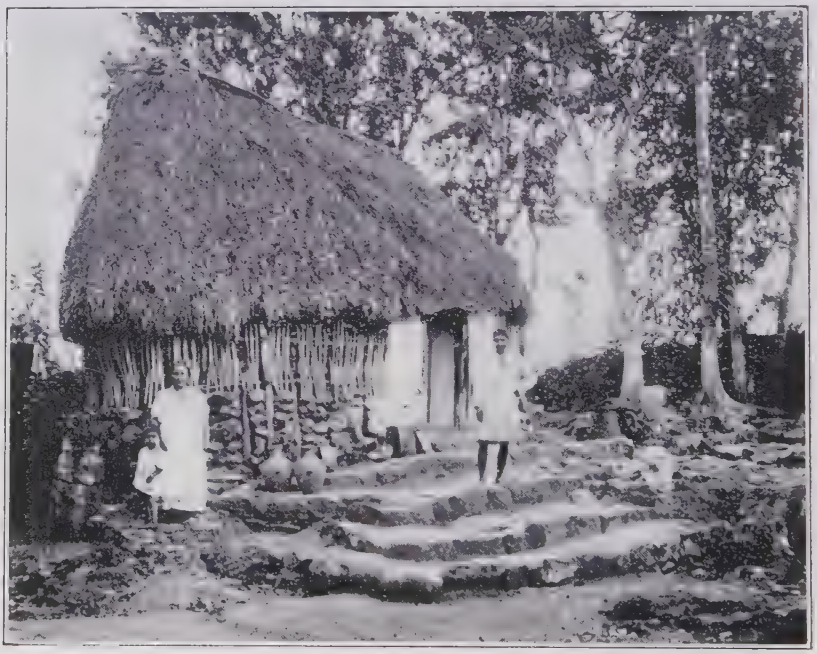

FIG. 5—A house in a Yucatan village.

The people of Yucatan consist of every gradation from pure Indians to pure Spaniards. The forests and the remoter villages are occupied by Indians of the Maya stock; the small towns and the less remote villages are peopled by a mixed race of Mestizoes in which the Indian element predominates, while in the larger towns and their environs the proportion of Spanish blood steadily rises. The degree of energy and initiative is almost directly in proportion to the amount of Spanish blood. The pure Indian is a quiet, slow being, inoffensive and retiring unless abused. He never seems to work unless compelled. As for storing up anything for the future, the thought seems never to enter his head. If he has enough to eat, he simply sits still and enjoys life until hunger again arouses him to activity. His wants are few and easily supplied. His agriculture begins by cutting the smaller trees of the jungle, girdling the few larger ones, leaving the brush to dry during the season of little rain, and finally burning it off. Then, with a pointed stick he makes holes into which he drops corn, beans, and the seeds of the pumpkin, or of one or two other vegetables. The corn is his chief reliance. When the crop is ripe, he never thinks of gathering it all at once, or of storing it away safely, perhaps in the form of flour. His method is to go out to the field in the early part of the dry season after the corn is well ripe, and bend down each stalk so that the ears point

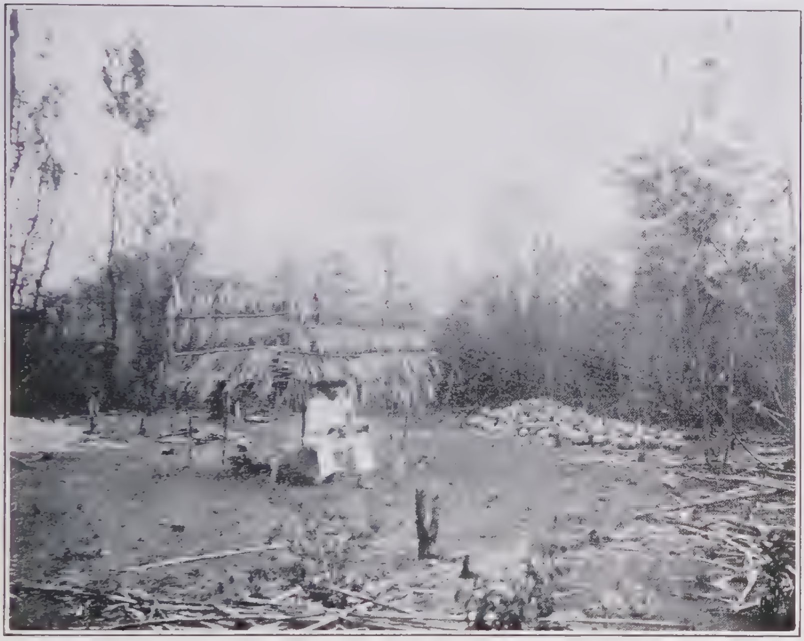

Fig. 6—An Indian seated beside the sleeping platform at his cornfield. Pumpkins on the right and corn cobs on the left.

downward and shed the occasional rains. Of course he uses what corn he needs day by day, and his wife grinds a little each morning for the day's tortillas, but beyond this he attempts little. Week by week he picks what ears he needs, caring nothing that insects, birds and beasts are eating what they need also. He knows that a quarter or a third of the ears may be spoiled, but so long as some are left, he cares little. The only thing that ultimately stirs him up to gather the remainder of the crop is the end of the dry season. Before the rains come he knows that he must burn over his field and plant more seed or else he will starve. Therefore he arouses himself for a period of effort at least once during the year. He is hardly to be blamed for his apparent laziness. He certainly is lazy according to our standards, but he has little to stimulate him, and it is easy to get a living without much work. In good qualities, however, he is by no means lacking. He is extremely courteous, and according to all accounts he excels in both honesty and morality.

As the amount of Spanish blood in the people of Yucatan increases, their energy and resourcefulness also increase. They also become more light-hearted and gay than the silent, sober Indians, but at the same time the degree of honesty and morality is said to decrease markedly. All classes of people are slow compared to Americans. During two weeks in Yucatan the only persons whom I remember to have seen running were Mr. E. H. Thompson, for many years United States Consul, and myself. Landing in New York, without having seen any other country in the interim, I confess to having felt almost bewildered by the rush. It was between five and six o'clock in the evening, and by comparison with Yucatan it seemed as if at that hour when people were hastening homeward, about one in ten actually ran. Even though I had been away but seven weeks I had to make a distinct effort to keep up with the crowd, although in Yucatan I had walked faster than almost anyone else. In this connection a fact as to the Spaniards is worth recording. In Yucatan, as well as in other parts of Mexico there is a surprisingly large number of recent Spanish immigrants. According to the almost universal testimony of the numerous people with whom I talked, these immigrants are better workers than the corresponding class of natives, no matter whether the natives are Indians, Mestizoes, or Spaniards who have been in the country a generation or two. Something in the new environment seems to make people slow. In part, this may be due to contact with an inferior race, but more probably it is a matter of climate. Possibly the heat has something to do with it, but there seems ground for believing that it is the uniformity of the temperature quite as much as its degree. Almost everyone agrees that the natives work hardest on "fresh" days, which may be either because the temperature is lower, or because there has has been a sudden change. When I asked Mr. Thompson about the matter he gave the same testimony as others. Then he went out and asked some of his old Indian friends about it. They agreed with the others, but added, "People work hardest the morning after a norther, after the wind has ceased, and while it is cool. On such days the women bake the tortillas much more quickly than usual, and we get away to work early." The men have to wait each morning until the women grind some flour and bake the universal thin cakes of corn meal known as tortillas. Hence the husbands are apt to take special notice of the days when the tortillas are ready early. Perhaps if Yucatan had a norther every three days instead of only at rare intervals the tortillas might even be baked the evening before.

The human inhabitants of Yucatan are distributed very unequally. Practically all of the 400,000 people of the peninsula live in the jungle region of Yucatan proper and the coastal strip north of Campeche, an area smaller than that of Massachusetts. The rest of the country, comprising most of the province of Campeche and the Federal District known as Quintana Roo, contains only a few wild Indians estimated at 4,000 or 5,000 in number. The reason is not far to seek; the tropical forest has hitherto proved unconquerable. I want to emphasize this matter a little, for it seems to be more important than is generally realized. Descriptions of tropical forests are usually couched in such indefinite terms that it is hard to tell whether a given area in its pristine condition would be covered with jungle or forest. So far as I can ascertain, however, practically all of the tropical regions where the natives have risen to such a state of relative civilization that they live permanently in good-sized villages and depend primarily upon agriculture for a living are located where the prevalent natural growth is of the type which we have defined as jungle. In such a region it is possible for people possessed of even the moderate efficiency of the tropics to get a living by agriculture. The small trees or bushes with a diameter of five inches or less may readily be hacked down with almost any kind of heavy knife; while the occasional larger ones may be girdled by cutting off the bark near the base, and will soon die. If this is done during the earlier part of the dry season, which is characteristic of all tropical regions where jungle prevails, the bushes and perhaps some of the girdled trees will be dry enough to burn before the rains come again. Hence it is a comparatively simple matter to clear a tract and plant it; moreover, if some of the few larger trees remain standing no harm is done.

In the true forest the case is quite different. In the first place the trees are large, the majority having trunks at least a foot in diameter and many of them much more. Moreover, they are chiefly species whose wood is hard. Hence it is difficult to cut them down. Only persons of great energy are capable of doing much of it. If the easier process of girdling is employed, the trees will die in course of time, and it would seem as though even the inefficient people of the tropics might thus clear large areas. Unfortunately another difficulty arises, which is serious where the trees are actually cut, and more so where they are girdled. The climate of the true tropical forests is so uniformly moist that even when trees have been felled, it takes a long time for them to become dry enough to burn. While they are drying, however, new vegetation begins to sprout, and by the time the trees are ready to burn the new growth is so

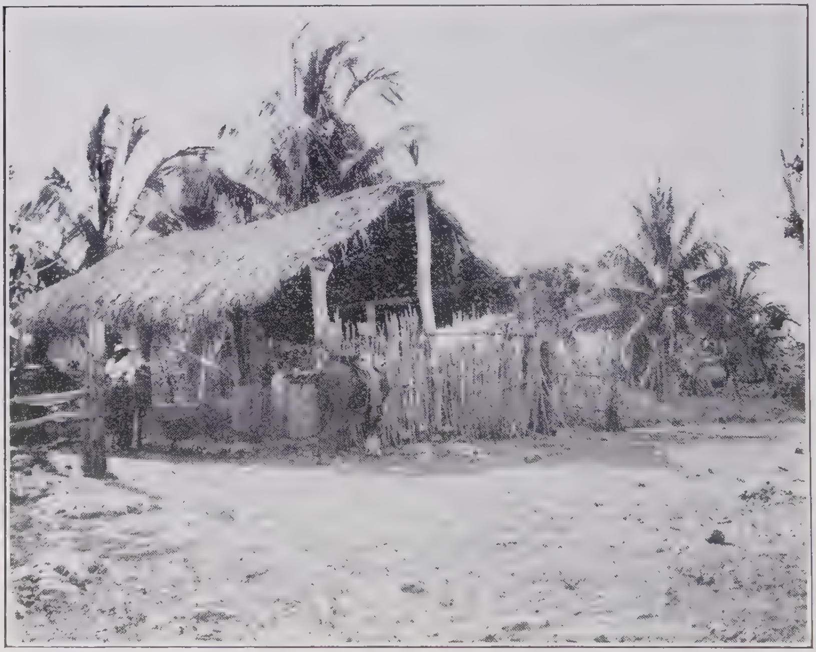

FIG. 7—A well in an Indian village.

large that it prevents the fire from spreading from tree to tree. That this is so is evident from the fact that even in the jungle region the fires which are lighted every year in the spring to burn off the corn stalks appear practically never to spread any great distance into the uncut jungle. The rapid growth of plants in the tropics is far greater than we commonly realize. One day as I was riding on the southern edge of the jungle, near the forest but well out of it, my guide remarked that the land over which we were passing had been cultivated three years before. Already the bushes were fifteen feet high. In the heart of the forest the growth is even faster. Hence the very rankness of the growth of plants is one of the primary reasons why man has never yet really mastered any considerable area where genuine tropical forests prevail.

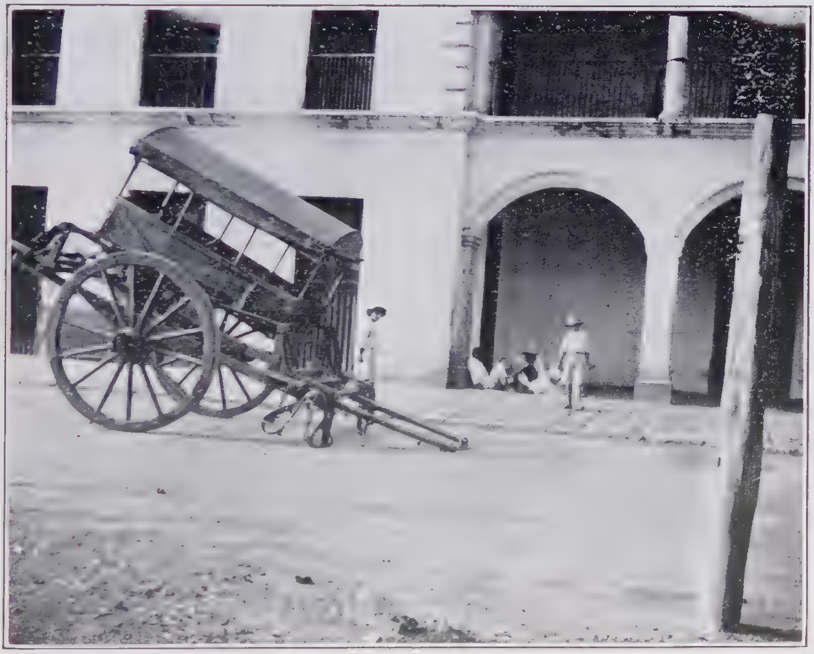

FIG. 8—A "volon" or carriage suspended on straps at a sugar estate in Yucatan. The roads are so rocky that carriages with ordinary springs cannot be used.

Other reasons for this also exist. For example, in the forest it is well known that malarial fevers are much worse than in the drier jungle. The natives are said to be immune to such fevers, but modern research throws doubt on this. The adults are immune, but how about the children? The researches of Sir Ronald Ross and of the Tropical School of Medicine at Liverpool have shown that in Greece, for instance, adults do not suffer much from malaria, but that at least half of the children have it badly during childhood and a large number bear its marks through life in the form of enlarged spleens and other injurious alterations of the organs. Every generation is apparently distinctly weakened by the diseases through which it passes in childhood. Similarly, in places such as Merida, where yellow fever is endemic, it is said that the natives never suffer, and that epidemics break out only when newcomers arrive from outside. Many physicians now think, however, that many of the children have the fever in infancy. Those who die are supposed to have suffered from other infant complaints, while those who recover are of course immune. In the case of yellow fever the after effects are generally not serious, but in the case of malarial fevers, especially the worse forms such as prevail in the tropics, the debilitating results often last through life. Thus it may be that the severe fevers of the forests, attacking the children and killing many of them, leave the remainder permanently weakened and incapacitated for the work of forwarding civilization in their hard surroundings.

So far as the indirect effects of climate upon human character are concerned there seems to be a curious contradiction between tropical and non-tropical regions. In the one case a relative lack of rain seems to be beneficial, while in the other it is in general detrimental. At least we seem to be safe in saying that the most progressive parts of the tropics are comparatively dry, while the most progressive countries of the temperate zone are usually in regions of comparative moisture. Aridity in the tropics is more favorable than moisture partly because the period for which man must make provision in order to tide over the months when no wild food can be obtained is much longer than in the moister regions. Where rain is sufficiently abundant, tropical fruits of some kind ripen at almost all seasons, and wild animals exist in great profusion. In the drier regions, that is where jungle prevails, fruits and seeds ripen chiefly at particular seasons determined by the advent of the rainy season. Moreover, the number of wild animals and birds is less than in the forests, and thus the supply of food is relatively deficient. This seems to force the man who would live, or who is obliged to live in the jungle to make provision for his needs beforehand, a necessity which must be of great value in developing him mentally. Or rather the portion of the community which is not brainy enough to make provision for the future is in danger of starving, and is gradually eliminated by the weakness and disease arising from its own improvidence. To be sure, the mental stimulus and selection due to relatively arid conditions in the tropics is very small compared with that arising from climatic conditions farther north, but nevertheless it is important.

One evidence of relatively high civilization in Yucatan is the cleanliness of the inhabitants. Not only is Merida, with its beautifully asphalted streets, one of the cleanest cities in the world, but the people themselves are extraordinarily clean. They are more completely and universally clothed than most tropical peoples, and their clothes, which are almost universally white, are kept immaculate by daily washing. The common custom is to take a bath and put on clean clothes at the end of the day's work, and then to wear the clean clothes the next day. Even the poor little newsboys come out each morning in undershirts and drawers which may be ragged but are always freshly washed. The dress of the ordinary men is no more than that of the boys, save that a sort of apron, like a towel, striped in pale blue, is wound around the waist and falls to the knees. The upper classes wear European dress, but white clothes greatly predominate, and are always clean. So common is cleanliness that one of the chief sources of matrimonial difficulties is said to be the failure of the wife to have the tepid water ready for her husband's bath on his return from work.

In the matter of cleanliness two other nations may be put in the same class with the Yucatecos, although it is doubtful whether they rival them. These are the Malays and the Japanese. In certain other countries, such as Cuba and the Philippines, the houses and streets may be dirty, but there is a high degree of personal cleanliness. So, too, in India the upper classes, the Brahmins and others, are notable for the amount of washing that they do. Outside of the tropics it is doubtful whether any nation is so generally clean in person as are those that have just been mentioned. The English boast of their cold tubs, but these are the luxury of the rich, not the everyday necessity of the poor. A crowd of English laborers under ordinary circumstances would seem to the Yucatecos very dirty and odoriferous. The reason for the cleanliness of these people seems to be their climate. They and the other races who are noted for their proneness to bathe live in regions where the atmosphere is practically always warm and where the rains fall heavily during the summer season, making the air extremely humid. If a nation begins to rise in the scale of civilization and adopts the practice of wearing clothes all the time, it is essential that the custom of bathing become common. The savages who go naked never need a bath, but the civilized people who wear clothes must wash both themselves and their clothes or else the perspiration which cannot evaporate into the moist air will soon render their skins and their clothing unendurably foul. Not only will they become obnoxious to themselves and to others, but they will be liable, apparently, to disease. Thus it would appear that the part of a community which dwells in a hot, damp climate and attempts to wear clothing but does not bathe will gradually tend to be eliminated by disease. Those who remain will have thoroughly learned the habit of cleanliness. The extreme excellence of the Yucatecos in this respect may be due to the fact that the Maya Indians have lived so long, for unknown milleniums perhaps, in the same environment. The newcomers who have invaded the country from Europe have followed the example of the natives in part, but "dirty as a Spaniard" is still a common saying. How far cleanliness is associated with other virtues such as strict sexual

FIG. 9—Ruins of the temple of Sayi.

morality it is hard to say, but it seems as if there must be some connection.

Among all the problems of Yucatan, as far as the geographer is concerned, perhaps the most interesting is that of the civilization of the past as compared with that of the present. To-day, in spite of the slowness and inefficiency of the inhabitants as compared with European races, the country compares most favorably with other tropical lands. Indeed it is so wealthy that some travelers have supposed Merida to be the richest city in the world in proportion to its size. Whether this be true or not there can be no doubt that the country is rich, and that signs of poverty are hard to find. Possibly this apparent prosperity is partly due to the excessive neatness of the people, for neatness is in most countries the luxury of the well-to-do. Perhaps, too, their neatness in itself is a help against poverty. However that may be, there is at the present time a distinct and special reason why Yucatan has an extraordinarily prosperous air, and impresses the casual traveler as quite different from most tropical countries. This reason is the henequen or sisal fiber

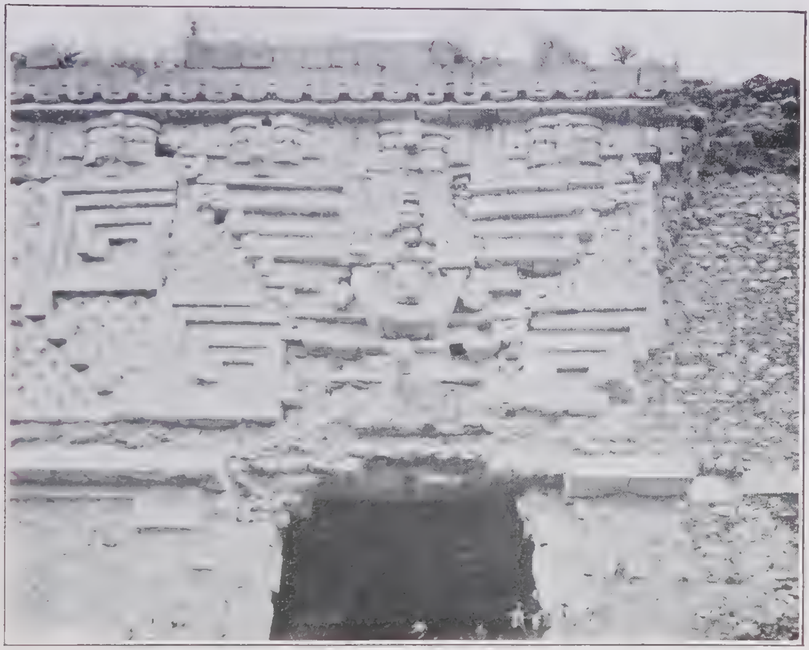

FIG. 10—Detail of the walls of a ruin at Kabah.

industry. Henequen, as is well known, is a species of yucca which grows well in the relatively dry portions of Yucatan. The fiber is the strongest and most durable known, its only rival being Manilla hemp. The growth of the demand for strong fibers, occasioned especially by the expansion of the grain fields in America and elsewhere, has for many years tended to increase the value of henequen, and has led to the planting of many square miles of the yucca in long, montonous rows extending across the hillocky plain between uncompromisingly angular stone walls. This, too, has led to the building of a large number of narrow-gauge railroads in the dry northern part of Yucatan, and to the construction of hundreds of miles of diminutive tram lines leading off from the railroad stations to the larger henequen "fincas." At the time of the Spanish War in 1898 the supply of Manila hemp was cut off for a few years and the price of henequen began to soar. Now it has fallen a good deal, but the fiber is still a highly valuable export and makes the country much more prosperous than it could be without the aid of some such highly specialized product. The whole aspect of the country shows

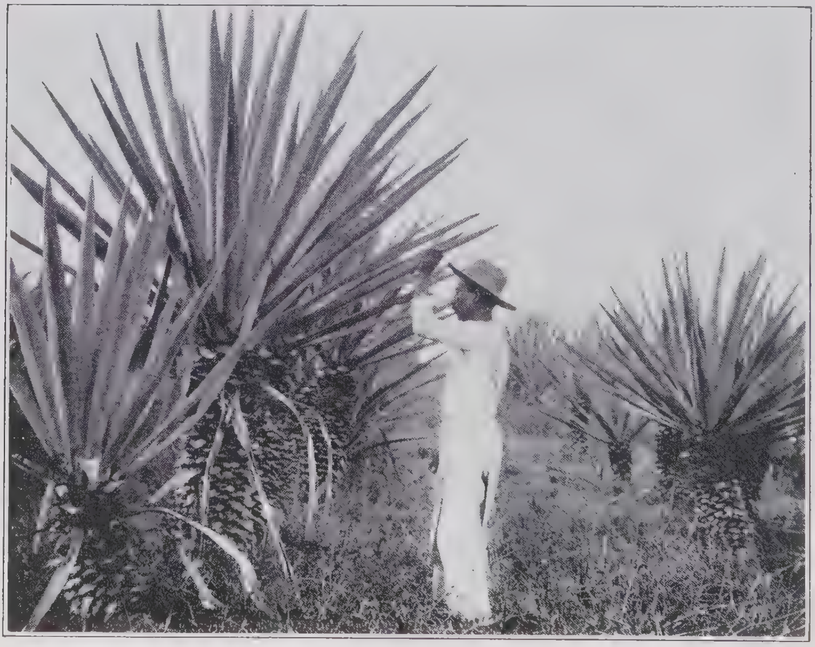

FIG. 11—The henequen or sisal plant.

this, for it is the cause not only of the abundant railroads and tram lines, the almost imposing houses at some of the estates, and the fine dwellings of Merida, but also of the excellent public buildings and finely paved streets which make such an impression upon the traveler when he first arrives.

The prosperity of to-day is apparently but a slight incident compared with that of the past. The present prosperity is in danger of proving ephemeral. It will vanish if another equally good fiber should be discovered in places where it can be raised more cheaply than in Yucatan. Even if it should last, it is an extraneous matter. It is due to the demands of the United States and other countries, it is fostered by their steamship lines, and its benefits are chiefly reaped not by the Indians and Mestizoes, but by people of Spanish blood, many of whom have not been in the country more than a generation or two. In the past, on the contrary, Yucatan had a high and long-enduring civilization which arose indigenously. I know that many people think that the seeds of Yucatecan culture in the hoary past were derived from Egypt or China or some other part of the Old World. I make no attempt to controvert this view, although I think that it is far from proven. This much, however, will be admitted by all: the connection between the Old World and the New, if any ever existed, was brief and one might say almost accidental. There was quite surely no such thing as any prolonged intercourse whereby for centuries ideas and methods of thought and action were transferred across the water. Moreover, the wonderful ruins of Yucatan, those great temples which arouse one's admiration just as do the monuments of Egypt, are distinctly Yucatecan in style. Whatever may have been imported from other parts of the world had remained long in Yucatan and had been remodelled to fit the genius of the old American race before it became fixed in the great structures which now excite our wonder. Yucatecan ideas in art, Yucatecan methods of supplying water in a land where there is none on the surface, and Yucatecan peculiarities of religion and taste had become strongly developed. Therefore we must conclude that even if some race from abroad did originally come to the land,—which many of the best authorities deny,—they did not stagnate and deteriorate as seems to be the case with modern immigrants after a generation or two. They did not imbibe the tropical languor which ultimately seems to check progress unless there is a continual stimulus from without. They kept on working, and developing new ideas. They had the industry to make some of the world's finest ruins, fashioned of carefully hewn stones and ornamented with wonderful carvings. And they did it all without the aid of iron. To develop so far must have required centuries, and so we may safely say that Yucatan once stimulated its people to an activity of mind and body comparable to that of any part of the world. Were the people capable of stimulation because of something in the fiber of the original race, or was the stimulus due to something in their environment?

AMUNDSEN'S EXPEDITION TO THE SOUTH POLE*

The plan of the third *Fram* expedition was twofold: first, the attainment of the South Pole and, second, the exploration of the North Polar regions. This evening I have the honor to report to you on the accomplishment of the first part of this plan.

I can only mention briefly here the expeditions which have worked in the region which we had selected for our starting point. As we wished to reach the South Pole our first problem was to go south as far as possible with our ship and there establish our station. Even so, the sled journeys would be long enough. I knew that the English expedition would again choose their old winter quarters in McMurdo Sound, South Victoria Land, as their starting point. From newspaper report it was known that the Japanese had selected King Edward VII Land. In order to avoid these two expeditions we had to establish our station on the Great Ice Barrier as far as possible from the starting points of the two other expeditions.

The Great Ice Barrier, also called the Ross Barrier, lies between South Victoria Land and King Edward VII Land and has an extent of about 515 miles† The first to reach this mighty ice formation was Sir James Clark Ross in 1841. He did not dare approach the great ice wall, 100 feet high, with his two sailing ships, the *Erebus* and the *Terror,* whose progress southward was impeded by this mighty obstacle. He examined the ice wall from a distance, however, as far as possible. His observations showed that the Barrier is not a continuous, abrupt ice wall, but is interrupted by bays and

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*Lecture delivered in German by Roald Amundsen before the Berlin Geographical Society on Oct. 9, 1912. Translated and reprinted from the *Zeitschr. der Gesell. für Erdkunde zu Berlin*, 1912, No. 7, pp. 481–498.

†All values have been changed from the metric system to English equivalents.

small channels. On Ross's map a bay of considerable magnitude may be seen.

The next expedition was that of the *Southern Cross* in 1900. It is interesting to note that this party found the bay mentioned above at the same place where Ross had seen it in 1841, nearly sixty years before; that this expedition also was able to land a few miles to the east of the large bay in a small bay, named Balloon Bight, and from there to ascend the Ice Barrier, which heretofore had been considered an insurmountable obstacle to further advance towards the south.

In 1901 the *Discovery* steamed along the Barrier and confirmed in every respect what the *Southern Cross* had observed. Land was also discovered in the direction indicated by Ross, namely King Edward VII Land. Scott, too, landed in Balloon Bight, and, like his predecessors, saw the large bay to the west.

In 1908 Shackleton arrived there on the *Nimrod*. He, too, followed along the edge of the Ice Barrier. He came to the conclusion that disturbances had taken place in the Ice Barrier. The shore line of Balloon Bight, he thought, had changed and merged with the large bay to the west. This large bay, which he thought to be of recent origin, he named Bay of Whales. He gave up his original plan of landing there, as the Ice Barrier appeared to him too dangerous for the establishment of winter quarters.

It was not difficult to determine that the bay shown on Ross's map and the so-called Bay of Whales are identical; it was only necessary to compare the two maps. Except for a few pieces that had broken off from the Barrier, the bay had remained the same for the last seventy years. It was therefore possible to assume that the bay did not owe its origin to chance and that it must be underlain by land, either in the form of sand banks or otherwise.

This bay we decided upon as our base of operations. It lies 400 miles from the English station in McMurdo Sound and 115 miles from King Edward VII Land. We could therefore assume that we should be far enough from the English sphere of interest and need not fear crossing the route of the English expedition. The reports concerning the Japanese station on King Edward VII Land were indefinite: we took it for granted, however, that a distance of 115 miles would suffice.

On August 9, 1910, we left Norway on the *Fram*, the ship that had originally been built for Nansen. We had ninety-seven superb Eskimo dogs and provisions for two years. The first harbor we reached was Madeira. There the last preparations were made for our voyage to the Ross Barrier—truly not an insignificant distance which we had to cover, namely, 16,000 nautical miles from Norway to the Bay of Whales. We had estimated that this trip would require five months. The *Fram,* which has justly been called the staunchest polar ship in the world, on this voyage across practically all of the oceans, proved herself to be extremely seaworthy. Thus we traversed without a single mishap the regions of the northeast and of the southeast trades, the stormy seas of the "roaring forties," the fogs of the fifties, the ice-filled sixties and reached our field of work at the Ice Barrier on Jan. 14, 1911. Everything had gone splendidly.

The ice in the Bay of Whales had just broken up, and we were able to advance considerably farther south than any of our predecessors had done. We found a quiet little nook behind a projecting ice cape; from here we could transfer our equipment to the Barrier with comparative safety. Another great advantage was that the Barrier at this place descended very gradually to the sea ice, so that we had the best possible surface for our sleds. Our first undertaking was to ascend the Barrier in order to get a general survey and to determine a suitable place for the erection of the house which we had brought with us. The supposition that this part of the Barrier rests on land seemed to be confirmed immediately by our surroundings. Instead of the smooth, flat surface which the outer wall of the Barrier presents, we here found the surface to be very uneven. We everywhere saw sharp hills and points between which there were pressure-cracks and depressions filled with large masses of drift. These features were not of recent date. On the contrary, it was easy to see that they were very old and that they must have had their origin at a time which long preceded the period of Ross's visit.

Originally we had planned to establish our station several miles from the edge of the Barrier, in order not to subject ourselves to the danger of an unwelcome and involuntary sea trip, which might have occurred had the part of the Barrier on which we erected our house broken off. This precaution, however, was not necessary, as the features which we observed on our first examination of the area offered a sufficient guarantee for the stability of the Barrier at this point.

In a small valley, hardly two and a half miles from the ship's anchorage, we therefore selected a place for our winter quarters. It was protected from the wind on all sides. On the next day we began unloading the ship. We had brought with us material for house building as well as equipment and provisions for nine men for several years. We divided into two groups, the ship's group and the land group. The first was composed of the commander of the ship, Captain Nilsen, and the nine men who were to stay on board to take the *Fram* out of the ice and to Buenos Aires. The other group consisted of the men who were to occupy the winter quarters and march on to the south. The ship's group had to unload everything from the ship upon the ice. There the land group took charge of the cargo and brought it to the building site. At first we were rather unaccustomed to work, as we had had little exercise on the long sea voyage. But before long we were all "broken in," and then the transfer to the site of our home "Framheim" went on rapidly; the house grew daily.

When all the material had been landed our skilled carpenters, Olav Bjaaland and Jörgen Stubberud, began building the house. It was a ready-made house which we had brought with us; nothing had to be done but to put together the various numbered parts. In order that the house might brave all storms, its bottom rested in an excavation four feet beneath the surface. On Jan. 28, fourteen days after our arrival, the house was completed, and all provisions had been landed. A gigantic task had been performed; everything seemed to point towards a propitious future. But no time was to be lost; we had to make use of every minute.

The land group had in the meantime been divided into two parties, one of which saw to it that the provisions and equipment still lacking were taken out of the ship. The other party was to prepare for an excursion towards the south which had in view the exploration of the immediate environs and the establishment of a depot.

On Feb. 10 the latter group marched south. There were four of us with eighteen dogs and three sleds packed with provisions. That morning of our start is still vividly in my memory. The weather was calm, the sky hardly overcast. Before us lay the large, unlimited snow plain, behind us the Bay of Whales with its projecting ice capes and at its entrance our dear ship, the *Fram*. On board the flag was hoisted; it was the last greeting from our comrades of the ship. No one knew whether and when we should see each other again. In all probability our comrades would no longer be there when we returned; a year would probably elapse before we could meet again. One more glance backwards, one more parting greeting and then—forward.

Our first advance on the Barrier was full of excitement and suspense. So many questions presented themselves: What will be the nature of the region we have to cross? How will the sleds behave? Will our equipment meet the requirements of the situation? Have we the proper hauling power? If we were to accomplish our object, everything had to be of the best. Our equipment was substantially different from that of our English competitors. We placed our whole trust on Eskimo dogs and skis, while the English, as a result of their own experience, had abandoned dogs as well as skis, but, on the other hand, were well equipped with motor sleds and ponies.

We advanced rapidly on the smooth, white snow plain. On Feb. 14 we reached 80° S. We had thus covered 99 miles. We established a depot here mainly of 1,300 pounds of provisions which we intended to use on our main advance to the south in the spring. The return journey occupied two days; on the first we covered forty miles and on the second fifty-seven miles. When we reached our station the *Fram* had already left. The bay was lonely and deserted; only seals and penguins were in possession of the place.

This first excursion to the south, although brief, was of great importance to us. We now knew definitely that our equipment and our pulling power were eminently suited to the demands upon them. In their selection no mistake had been made. It was now for us to make use of everything to the best advantage.

Our sojourn at the station was only a short one. On Feb. 22 we were ready again to carry supplies to a more southern depot. We intended to push this depot as far south as possible. On this occasion our expedition consisted of eight men, seven sleds, and forty-two dogs. Only the cook remained at "Framheim."

On Feb. 27 we passed the depot which we had established at 80° S.; we found everything in the best of order. On March 4 we reached the eighty-first parallel and deposited there 1,150 pounds of provisions. Three men returned from here to the station while the five others continued toward the south and reached the eighty-second parallel on March 8, depositing there 1,375 pounds of provisions. We then returned, and on March 22 were again at home. Before the winter began we made another excursion to the depot in 80° S., and added to our supplies there 2,400 pounds of fresh salt meat and 440 pounds of other provisions. On April 11 we returned from this excursion; this ended all of our work connected with the establishment of depots. Up to that date we had carried out 6,700 pounds of provisions and had distributed these in three repositories.

The part of the Barrier over which we had gone heretofore has an average height of 105 feet and looked like a flat plain which continued with slight undulations without any marked features that could have served for orientation. It has heretofore been the opinion that on such an endless plain no provisions can be cached without risking their loss. If we were, however, to have the slightest chance of reaching our goal we had to establish depots, and that to as great an extent as possible. This question was discussed among us, and we decided to establish signs across our route, and not along it, as has been generally done heretofore. We therefore set up a row of signs at right angles to our route, that is in an east-west direction from our depots. Two of these signs were placed on opposite sides of each of the three depots, at a distance of 5.6 miles (9 kilometers) from them; and between the signs and the depot two flags were erected for every kilometer. In addition, all flags were marked so that we might know the direction and distance of the depot to which it referred. This provision proved entirely trustworthy; we were able to find our depots even in dense fog. Our compasses and pedometers were tested at the station; we knew that we could rely upon them.

By our excursions to the depots we had gained a great deal. We had not only carried a large amount of provisions towards the south, but we had also gained valuable experience. That was worth more and was to be of value to us on our final advance to the pole.

The lowest temperature we had observed on these depot excursions was —50° Centigrade. The fact that it was still summer when we recorded this temperature warned us to see that our equipment was in good condition. We also realized that our heavy sleds were too unwieldly and that they could easily be made much lighter. This criticism was equally applicable to the greater part of our equipment.

Several days before the disappearance of the sun were devoted to hunting seal. The total weight of the seals killed amounted to 132,000 pounds. We therefore had ample provisions for ourselves as well as for our 115 dogs.

Our next problem was to supply a protective roof for our dogs. We had brought with us ten large tents in which sixteen men could easily find room. They were set up on the Ice Barrier; the snow was then dug out to a depth of six and a half feet inside the tents, so that each dog hut was nearly twenty feet high. The diameter of a dog hut on the ground was sixteen feet. We made these huts spacious so that they might be as airy as possible and thus avert the frost which is so injurious to dogs. Our purpose was entirely attained, for even in the severest weather no dogs were frozen. The tents were always warm and comfortable. Twelve dogs were housed in each, and every man had to take care of his own pack.

After we had seen to the wants of the dogs we could then think of ourselves. As early as April the house was entirely covered by snow. In this newly drifted snow, passageways were dug connecting directly with the dog huts. Ample room was thus at our disposal without the need on our part of furnishing building material. We had workshops, a blacksmith shop, a room for sewing, one for packing, a storage room for coal, wood and oil, a room for regular baths and one for steam baths. The winter might be as cold and stormy as it would; it could do us no harm.

On April 21 the sun disappeared and the longest night began which had ever been experienced by man in the Antarctic. We did not need to fear the long night for we were well equipped with provisions for years and had a comfortable, well-ventilated, well-situated and protected house. In addition we had our splendid bathroom where we could take a bath every week. It really was a veritable sanatorium.

After these arrangements had been completed we began preparations for the main advance in the following spring. We had to improve our equipment and make it lighter. We discarded all our sleds, for they were too heavy and unwieldy for the smooth surface of the Ice Barrier. Our sleds weighed 165 pounds each. Bjaaland, our ski and sled maker, took the sleds in hand, and when spring arrived he had entirely made over our sledge equipment. These sleds weighed only one-third as much as the old ones. In the same way it was possible to reduce the weight of all other items of our equipment. Packing the provisions for the sledge journey was of the greatest importance. Capt. Johansen attended to this work during the winter. Each of the 42,000 loaves of hard bread had to be handled separately before it could be assigned to its proper place. In this way the winter passed quickly and agreeably. All of us were occupied all the time. Our house was warm, dry, light and airy, and we all enjoyed the best of health. We had no physician and needed none.

Meteorological observations were taken continuously. The results were surprising. We had thought that we should have disagreeable, stormy weather, but this was not the case. During the whole year of our sojourn at the station we experienced only two moderate storms. The rest of the time light breezes prevailed, mainly from an easterly direction. Atmospheric pressure was as a rule very low, but remained constant. The temperature sank considerably, and I deem it probable that the mean annual temperature which we recorded, —26° Centigrade, is the lowest mean temperature which has ever been observed. During five months of the year we recorded temperatures below —50° Centigrade. On Aug. 23 the lowest temperature was recorded, —59°. The *aurora australis,* corresponding to the northern lights of the Arctic, was observed frequently and in all directions and forms. This phenomenon changed very rapidly, but, except in certain cases, was not very intensive.

On Aug. 24 the sun reappeared. The winter had ended. Several days earlier we had put everything in the best of order, and when the sun rose over the Barrier we were ready to start. The dogs were in fine condition.

From now on we observed the temperature daily with great interest, for as long as the mercury remained below —50° a start was not to be thought of. In the first days of September all signs indicated that the mercury would rise. We therefore resolved to start as soon as possible. On Sept. 8 the temperature was —30°. We started immediately, but this march was to be short. On the next day the temperature began to sink rapidly, and several days later the thermometer registered —55° Centigrade. We human beings could probably have kept on the march for some time under such a temperature, for we were protected against the cold by our clothing; but the dogs could not have long withstood this degree of cold. We were therefore glad when we reached the eightieth parallel. We deposited there our provisions and equipment in the depot which we had previously erected and returned to "Framheim."

The weather now became very changeable for a time—the transitional period from winter to summer; we never knew what weather the next day would bring. Frostbites from our last march forced us to wait until we definitely knew that spring had really come. On Sept. 24 we saw at last positive evidence that spring had arrived: the seals began to clamber up on the ice. This sign was hailed with rejoicing—not a whit less the seal meat which Bjaaland brought on the same day. The dogs, too, enjoyed the arrival of spring. They were ravenous for fresh seal meat. On Sept. 29 another unrefutable sign of spring appeared in the arrival of a flock of Antarctic petrels. They flew around our house inquisitively to the joy of all, not only of ourselves, but also of the dogs. The latter were wild with joy and excitement, and ran after the birds in hopes of getting a delicate morsel. Foolish dogs! Their chase ended with a wild fight among themselves.

On Oct. 20 the weather had at last become so stable that we could start. We had, meanwhile, changed our original plan, which was that we should all advance southward together. We realized that we could travel with perfect safety in two groups and thus accomplish much more. We arranged that three men should go to the east to explore King Edward VII Land; the remaining five men were to carry out the main plan, the advance on the South Pole.

October 20 was a beautiful day. Clear, mild weather prevailed. The temperature was 1° Centigrade above zero. Our sleds were light, and we could advance rapidly. We did not need to hurry our dogs for they were eager enough themselves. We numbered five men and fifty-two dogs with four sleds. Together with the provisions which we had left in the three depots at the eightieth, the eighty-first and the eighty-second parallels we had sufficient sustenance for 120 days.

Two days after our departure we nearly met with a serious accident. Bjaaland's sled fell into one of the numerous crevasses. At the critical moment we were fortunately able to come to Bjaaland's aid; had we been a moment later the sled with its thirteen dogs would have disappeared in the seemingly bottomless pit.

On the fourth day we reached our depot at 80° S. We remained there two days and gave our dogs as much seal meat as they would eat.

Between the eightieth and the eighty-first parallel the Barrier ice along our route was even, with the exception of a few low undulations; dangerous hidden places were not to be found. The region between the eighty-first and the eighty-second parallel was of a totally different character. During the first nineteen miles we were in a veritable labyrinth of crevasses, very dangerous to cross. At many places yawning abysses were visible because large pieces of the surface had broken off; the surface therefore presented a very unsafe appearance. We crossed this region four times in all. On the three first times such a dense fog prevailed that we could only recognize objects a few feet away. Only on the fourth occasion did we have clear weather. Then we were able to see the great difficulties to which we had been exposed.

On Nov. 5 we reached the depot at the eighty-second parallel and found everything in order. For the last time our dogs were able to have a good rest and eat their fill; and they did so thoroughly during their two days' rest.

Beginning at the eightieth parallel we constructed snow cairns which should serve as sign-posts on our return. In all we erected 150 such sign-posts, each of which required sixty snow blocks. About 9,000 snow blocks had therefore to be cut out for this purpose. These cairns did not disappoint us, for they enabled us to return by exactly the same route we had previously followed.

South of the eighty-second parallel the Barrier was, if possible, still more even than farther north; we therefore advanced quite rapidly. At every unit parallel which we crossed on our advance towards the south we established a depot. We thereby doubtlessly exposed ourselves to a certain risk, for there was no time to set up sign-posts around the depots. We therefore had to rely on snow cairns. On the other hand, our sleds became lighter, so that it was never hard for the dogs to pull them.

When we reached the eighty-third parallel we saw land in a southwesterly direction. This could only be South Victoria Land, probably a continuation of the mountain range which runs in a southeasterly direction and which is shown on Shackleton's map. From now on the landscape changed more and more from day to day: one mountain after another loomed up, one always higher than the other. Their average elevation was 10,000 to 16,000 feet. Their crest-line was always sharp; the peaks were like needles. I have never seen a more beautiful, wild and imposing landscape. Here a peak would appear with somber and cold outlines, its head buried in the clouds; there one could see snow fields and glaciers thrown together in hopeless confusion. On Nov. 11 we saw land to the south and could soon determine that a mountain range, whose position is about 86° S. and 163° W., crosses South Victoria Land in an easterly and northeasterly direction. This mountain range is materially lower than the mighty mountains of the rest of South Victoria Land. Peaks of an elevation of 1,800 to 4,000 feet were the highest. We could see this mountain chain as far as the eighty-fourth parallel, where it disappeared below the horizon.

On Nov. 17 we reached the place where the Ice Barrier ends and the land begins. We had proceeded directly south from our winter quarters to this point. We were now in 85° 7′ S. and 165° W. The place where we left the Barrier for the land offered no special difficulties. A few extended undulating reaches of ice had to be crossed which were interrupted by crevasses here and there. Nothing could impede our advance. It was our plan to go due south from "Framheim" and not to deviate from this direction unless we should be forced to by obstacles which nature might place in our path. If our plan succeeded it would be our privilege to explore completely unknown regions and thereby to accomplish valuable geographic work.

The immediate ascent due south into the mountainous region led us between the high peaks of South Victoria Land. To all intents and purposes no great difficulties awaited us here. To be sure, we should probably have found a less steep ascent if we had gone over to the newly discovered mountain range just mentioned. But as we maintained the principle that direct advance due south was the shortest way to our goal, we had to bear the consequences.

At this place we established our principal depot and left provisions for thirty days. On our four sleds we took provisions with us for sixty days. And now we began the ascent to the plateau. The first part of the way led us over snow-covered mountain slopes, which at times were quite steep, but not so much so as to prevent any of us from hauling up his own sled. Farther up, we found several glaciers which were not very broad but were very steep. Indeed, they were so steep that we had to harness twenty dogs in front of each sled. Later the glaciers became more frequent, and they lay on slopes so steep that it was very hard to ascend them on our skis. On the first night we camped at a spot which lay 2,100 feet above sea level. On the second day we continued to climb up the mountains, mainly over several small glaciers. Our next camp for the night was at an altitude of 4,100 feet above the sea.

On the third day we made the disagreeable discovery that we should have to descend 2,100 feet, as between us and the higher mountains to the south lay a great glacier which crossed our path from east to west. This could not be helped. The expedition therefore descended with the greatest possible speed and in an incredibly short time we were down on the glacier, which was named Axel Heiberg Glacier. Our camp of this night lay at about 3,100 feet above sea level. On the following day the longest ascent began; we were forced to follow Axel Heiberg Glacier. At several places ice blocks were heaped up so that its surface was hummocky and cleft by crevasses. We had therefore to make detours to avoid the wide crevasses which, below, expanded into large basins. These latter, to be sure, were filled with snow; the glacier had evidently long ago ceased to move. The greatest care was necessary in our advance, for we had no inkling as to how thick or how thin the cover of snow might be. Our camp for this night was pitched in an extremely picturesque situation at an elevation of about 5,250 feet above sea level. The glacier was here hemmed in by two mountains which were named "Fridtjof Nansen" and "Don Pedro Christophersen," both 16,000 feet high.

Farther down towards the west at the end of the glacier "Ole Engelstad Mountain" rises to an elevation of about 13,000 feet. At this relatively narrow place the glacier was very hummocky and rent by many deep crevasses, so that we often feared that we could not advance farther. On the following day we reached a slightly inclined plateau which we assumed to be the same which Shackleton describes. Our dogs accomplished a feat on this day which is so remarkable that it should be mentioned here. After having already done heavy work on the preceding days, they covered nineteen miles on this day and overcame a difference in altitude of 5,700 feet. On the following night we camped at a place which lay 10,800 feet above sea level. The time had now come when we were forced to kill some of our dogs. Twenty-four of our faithful comrades had to die. The place where this happened was named the "Slaughter House." On account of bad weather we had to stay here for four days. During this stay both we and the dogs had nothing except dog meat to eat. When we could at last start again on Nov. 26, the meat of ten dogs only remained. This we deposited at our camp; fresh meat would furnish a welcome change on our return. During the following days we had stormy weather and thick snow flurries, so that we could see nothing of the surrounding country. We observed, however, that we were descending rapidly. For a moment, when the weather improved for a short time, we saw high mountains directly to the east. During the heavy snow squall on Nov. 28 we passed two peculiarly shaped mountains lying in a north-south direction; they were the only ones that we could see on our right hand. These "Helland-Hansen Mountains" were entirely covered by snow and had an altitude of 9,200 feet. Later they served as an excellent landmark for us.

On the next day the clouds parted and the sun burst forth. It seemed to us as if we had been transferred to a totally new country. In the direction of our advance rose a large glacier, and to the east of it lay a mountain range running from southeast to northwest. Toward the west, impenetrable fog lay over the glacier and obscured even our immediate surroundings. A measurement by hypsometer gave 8,200 feet for the point lying at the foot of this, the "Devil's Glacier." We had therefore descended 2,600 feet since leaving the "Slaughter House." This was not an agreeable discovery, as we, no doubt, would have to ascend as much again, if not more. We left provisions here for six days and continued our march.

From the camp of that night we had a superb view of the eastern mountain range. Belonging to it we saw a mountain of more wonderful form than I have ever seen before. The altitude of the mountain was 12,300 feet; its peaks roundabout were covered by a glacier. It looked as if Nature, in a fit of anger, had dropped sharp cornered ice blocks on the mountain. This mountain was christened "Helmer-Hansen Mountain," and became our best point of reference. There we saw also the "Oscar Wisting Mountains," the "Olav Bjaaland Mountains," the "Sverre Hassel Mountains," which, dark and red, glittered in the rays of the midnight sun and reflected a white and blue light. In the distance the mountains seen before loomed up romantically; they looked very high when one saw them through the thick clouds and masses of fog which passed over them from time to time and occasionally allowed us to catch glimpses of their mighty peaks and their broken glaciers. For the first time we saw the "Thorvald Nilsen Mountain," which has a height of 16,400 feet.

It took us three days to climb the "Devil's Glacier." On the first of December we had left behind us this glacier with its crevasses and bottomless pits and were now at an elevation of 9,350 feet above sea level. In front of us lay an inclined block-covered ice plateau which, in the fog and snow, had the appearance of a frozen lake. Traveling over this "Devil's Ball Room," as we called the plateau, was not particularly pleasant. Southeasterly storms and snow flurries occurred daily during which we could see absolutely nothing. The floor on which we were walking was hollow beneath us; it sounded as if we were going over empty barrels. We crossed this disagreeable and uncanny region as quickly as was compatible with the great care we had to exercise, for during the whole time we were thinking of the unwelcome possibility of sinking through.

On Dec. 6 we reached our highest point—according to hypsometric measurement 11,024 feet above sea level. From there on the interior plateau remained entirely level and of the same elevation. In 88°23′ S. we had reached the place which corresponded to Shackleton's southernmost advance. We camped in 88°25′ S. and established there our last—the tenth—depot, in which we left 220 pounds of provisions. Our way now gradually led downward. The surface was in excellent condition, entirely level, without a single hill or undulation or other obstacle. Our sleds forged ahead to perfection; the weather was beautiful; we daily covered seventeen miles. Nothing prevented us from increasing our daily distance. But we had time enough and ample provisions; we thought it wiser, also, to spare our dogs and not to work them harder than necessary. Without a mishap we reached the eighty-ninth parallel on Dec. 11. It seemed as if we had come into a region where good weather constantly prevails. The surest sign of continued calm weather was the absolutely level surface. We could push a tent pole seven feet deep into the snow without meeting with any resistance. This proved clearly enough that the snow had fallen in equable weather; calm must have prevailed or a slight breeze may have blown at the most. Had the weather been variable—calms alternating with storms—snow strata of different density would have formed, a condition which we would immediately have noticed when driving in our tent poles.

Our dead reckoning had heretofore always given the same results as our astronomical observations. During the last eight days of our march we had continuous sunshine. Every day we stopped at noon in order to measure the meridian altitude and every evening we made an observation for azimuth. On Dec. 13 the meridian altitude gave 89°37′, dead reckoning, 89°38′. In latitude 88°25′ we had been able to make our last good observation of azimuth. Subsequently this method of observation became valueless. As these last observations gave practically the same result and the difference was almost a constant one we used the observation made in 88°25′ as a basis. We calculated that we should reach our goal on Dec. 14.

Dec. 14 dawned. It seemed to me as if we slept a shorter time, as if we ate breakfast in greater haste and as if we started earlier on this morning than on the preceding days. As heretofore, we had clear weather, beautiful sunshine and only a very light breeze. We advanced well. Not much was said. I think that each one of us was occupied with his own thoughts. Probably only one thought dominated us all, a thought which caused us to look eagerly towards the south and to scan the horizon of this unlimited plateau. Were we the first, or ———?

The distance calculated was covered. Our goal had been reached. Quietly, in absolute silence, the mighty plateau lay streched out before us. No man had ever yet seen it, no man had ever yet stood on it. In no direction was a sign to be seen. It was indeed a solemn moment when, each of us grasping the flagpole with one hand, we all hoisted the flag of our country on the geographical South Pole, on "King Haakon VII Plateau."

During the night, as our watches showed it to be, three of our men went around the camp in a circle ten geographical miles (11.6 statute miles) in diameter and erected cairns, while the other two men remained in the tent and made hourly astronomical observations of the sun. These gave 89°55′ S. We might well have been satisfied with this result, but we had time to spare and the weather was fine. Why should we not try to make our observations at the Pole itself? On Dec. 16, therefore, we transported our tent the remaining 5¾ miles to the south and camped there. We arranged everything as comfortably as possible in order to make a round of observations during the twenty-four hours. The altitude was measured every hour by four men with the sextant and artificial horizon. These observations will be worked out at the University of Christiania. This tent camp served as the center of a circle which we drew with a radius of 5 1/6 miles [on the circumference of which] cairns were erected. A small tent which we had brought with us in order to designate the South Pole was put up here and the Norwegian flag with the pennant of the *Fram* was hoisted above it. This Norwegian home received the name of "Polheim." According to the observed weather conditions, this tent may remain there for a long time. In it we left a letter addressed to His Majesty, King Haakon VII, in which we reported what we had done. The next person to come there will take the letter with him and see to its delivery. In addition, we left there several pieces of clothing, a sextant, an artificial horizon, and a hypsometer.

On Dec. 17 we were ready to return. On our journey to the Pole we had covered 863 miles, according to the measurements of the odometer; our mean daily marches were therefore 15 miles. When we left the Pole we had three sleds and seventeen dogs. We now experienced the great satisfaction of being able to increase our daily rations, a measure which previous expeditions had not been able to carry out, as they were all forced to reduce their rations, and that at an early date. For the dogs, too, the rations were increased, and from time to time they received one of their comrades as additional food. The fresh meat revived the dogs and undoubtedly contributed to the good results of the expedition.

One last glance, one last adieu, we sent back to "Polheim." Then we resumed our journey. We still see the flag; it still waves to us. Gradually it diminishes in size and finally entirely disappears from our sight. A last greeting to the Little Norway lying at the South Pole!

We left King Haakon VII Plateau, which lay there bathed in sunshine, as we had found it on our outward journey. The mean temperature during our sojourn there was —13° Centigrade. It seemed, however, as though the weather was much milder.

I shall not tire my esteemed auditors by a detailed description of our return, but shall limit myself to some of the interesting episodes.

The splendid weather with which we were favored on our return displayed to us the panorama of the mighty mountain range which is the continuation of the two ranges which unite in 86° S. The newly discovered range runs in a southeasterly direction and culminates in domes of an elevation of 10,000 to over 16,000 feet. In 88° S. this range disappears in the distance below the horizon. The whole complex of newly discovered mountain ranges, which may extend a distance of over 500 miles, has been named the Queen Maud Ranges.

We found all of our ten provision depots again. The provisions, of which we finally had a superabundance, were taken with us to the eightieth parallel and cached there. From the eighty-sixth parallel on we did not need to apportion our rations; everyone could eat as much as he desired.

After an absence of ninety-nine days we reached our winter quarters, "Framheim," on Jan. 25. We had, therefore, covered the journey of 864 miles in thirty-nine days, during which we did not allow ourselves any days of rest. Our mean daily march, therefore, amounted to 22.1 miles. At the end of our journey two of our sleds were in good condition and eleven dogs healthy and happy. Not once had we needed to help our dogs and to push the sleds ourselves.

Our provisions consisted of pemmican, biscuits, desiccated milk, and chocolate. We therefore did not have very much variety, but it was healthful and robust nourishment which built up the body, and it was of course just this that we needed. The best proof of this was that we felt well during the whole time and never had reason to complain of our food, a condition which has occurred so often on long sledge journeys and must be considered a sure indication of improper nourishment.

During our absence, Lieut. Prestrud with his two companions had done excellent work towards the east and in the vicinity of the Bay of Whales. They succeeded in reaching King Edward VII Land, which Scott had discovered, and in confirming what we had seen. It was found that the Alexandra Mountains are a range entirely snow covered and with an elevation of 1,230 feet. They run in a southeasterly direction as far as the eye can reach and are bounded on the north by mountains 2,000 feet high, which were named "Nutakar" by Scott.

The observations made on this expedition in the neighborhood of

"Framheim" are of great interest. They resulted in determining that the Bay of Whales has a snow-covered bottom.

Simultaneously with our work on land, scientific observations were made on board the *Fram* by Captain Nilsen and his companions which probably stamp this expedition as the most valuable of all. The *Fram* made a voyage from Buenos Aires to the coast of Africa and back, covering a distance of 8,000 nautical miles, during which a series of oceanographical observations was made at no less than sixty stations. The total length of the *Fram's* journey equaled twice the circumnavigation of the globe. The *Fram* has successfully braved dangerous voyages which made high demands upon her crew. The trip out of the ice region in the fall of 1911 was of an especially serious character. Her whole complement then comprised only ten men. Through night and fog, through storm and hurricane, through pack ice and between icebergs the *Fram* had to find her way. One may well say that this was an achievement that can be realized only by experienced and courageous sailors, a deed that honors the whole nation.

In conclusion, you will allow me to say that it was these same ten men, who on Feb. 15, 1911, hoisted the flag of their country, the Norwegian flag, on a more southerly point of the earth than the crew of any other ship whose keel ever cleft the waves.* This is a worthy record in our record century. Farthest north, farthest south did our dear old *Fram* penetrate.

DEVELOPMENT AND STATE OF PROGRESS OF THE UNITED STATES PORTION OF THE INTERNATIONAL MAP OF THE WORLD

BY

W. L. G. JOERG

(Map facing p. 842.)

During the visit of the Transcontinental Excursion of this Society to the United States Geological Survey in Washington on October 14, 1912, the members were given every opportunity to acquaint themselves with the present state of progress of the portion of the International Map of the World being compiled by the Survey. In view of the fact that this information has not been easily accessible in print, the following notes, covering also the history of the development of that portion, together with the accompanying map, in the preparation of both of which the Geological Survey has given generous assistance, may prove of interest.

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* The *Fram* penetrated to the head of the Bay of Whales, 78°41′ S. (*New York Times*, March 9, 1912.)

The first steps taken by the Geological Survey to compile a general map of the United States similar in scope to the International Map antedated by several years the meeting of the International Map Committee in London in November, 1909. As early as 1903 or 1904 the Survey had prepared in manuscript contour maps on the scale of 12 miles to the inch of Colorado, New Mexico, Arizona, Wyoming, Delaware, Maryland, Virginia and West Virginia.* Actuated by Professor Penck's appeal at the Eighth International Geographic Congress in Washington in September, 1904, that the United States follow the example set by the British, French and Prussian War Offices with regard to maps of other parts of the world and undertake the preparation of a map of North and South America on the millionth scale,† Dr. Henry Gannett was authorized by the then director of the Survey, Dr. Walcott, to prepare a number of maps designed to become part of the United States portion of the International Map.‡ The Twenty-Sixth Report of the Survey (for 1904-05) correspondingly refers (p. 159) to the "compilation of maps of portions of the United States on a manuscript scale of 12 miles to the inch with the purpose of publishing them in sheets on a scale of 1 : 1,000,000" as part of the office work of the Division of Geography and Forestry for that year. The two subsequent reports give slightly different accounts of the purpose of the map. The Twenty-Seventh Report (p. 21) refers to progress made in the "assembling of data for the preparation of geologic maps of the States, or of groups of States, on the scale of 1 : 1,000,000." The Twenty-Eighth Report (for 1906-7), the first published under the present director, Dr. George Otis Smith, contains the first definite announcement (p. 4) of the fact that the Survey had undertaken the preparation of a map of the United States according to the scheme "adopted by international agreement," to which is added, however, the statement that this map "will be employed primarily by the Survey as a base for a general geologic map of the United States, but the base will be designed with a view to all the manifold uses which Federal and State officials and the people have for a general map."

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* Twenty-Fifth Annual Report, p. 237.

† Report Eighth Intern. Geogr. Congr., pp. 555-557.

‡ Bailey Willis: The International Millionth Map of the World, *Natl. Geogr. Mag.*, Vol. 21, 1910, p. 127.

The next reference to the progress made on the United States portion of the International Map is found in a letter from Dr. Gannett to the President of the Ninth International Geographic Congress at Geneva, dated June 30, 1908.* In it mention is made of the compilation of manuscript contour maps of different states on the scale of 12 miles to the inch, the following states being designated as completed in addition to those enumerated in the Twenty-Fifth Report: Ohio, Oklahoma, Kansas, Nebraska and Utah. Arizona, Wyoming (these two were given as completed in the Twenty-Fifth Report) and California are reported as almost complete, and Oregon Nevada, Idaho and South Dakota as partially compiled. A map of the United States showing the areas compiled, together with a photographic reduction to 1 : 1,000,000 of the map of Colorado, accompanied this letter.

These state contour maps, although covering about twenty-eight per cent. of the area of the United States, were finally not destined, however, to be used as direct bases for the International Map owing to the fact that the Survey committee entrusted with this matter subsequently decided that they were not adequate for this purpose. Nevertheless, their compilation was in no way in vain. Their preparation and the various discussions of the subject resulted in the decision of the Survey to begin anew the compilation of sheets of an international map, in the belief that in a short time the standardizing of this undertaking would be assured. The work was entrusted to the Topographic Branch, under the general supervision and direction of R. B. Marshall, Chief Geographer. A. F. Hassan, cartographer, was placed in direct charge, and in June, 1908, the compilation of the first sheets of the United States portion of the International Map of the World was begun. Photographic copies of the sheets were exhibited at the meeting of the International Map Committee in London in November, 1909. It was a source of gratification to the Survey that the size, the general style and, in the main, the conventional signs used on these sheets were adopted by the committee.

The rules governing the preparation of the International Map once laid down the progress of the United States portion could advance rapidly.* Only a little over two years elapsed after the London meeting before the first sheet, North K-19, was issued in February, 1912. This was a preliminary edition without hypsometric coloring: the final edition has just been published in October.

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* Compte Rendu, Neuvième Congr. Intern. de Géogr., Geneva, 1909. Vol. I, pp. 333-334.

Before referring to this sheet a few words with regard to the method of compiling the map and its present state of progress may be of interest.

The map is compiled on the scale of 1 : 500,000 as a base map, *i. e.*, the topological element (drainage, boundaries, railroads, towns, etc.) alone, exclusive of relief, is prepared. The area thus completed is shown in stippling on the accompanying index map (on which the Maryland portion of Sheet J-17 and the Louisiana portion of Sheet H-16 should also be stippled). The unit for compilation is the international sheet.† Frequent demands for base maps of states, however, have led, in some cases, to the compilation of state portions of an international sheet prior to its completion as a unit. The proper portions of the relevant international sheets are then assembled by states to be reproduced on the same scale by photo-lithography and published in black and white as state base maps. State base maps on the scale of 1 : 500,000 have already been published of the following states, as will be seen on the accompanying map: Vermont, Indiana, Illinois, Iowa, Minnesota, Mississippi, Georgia.‡ Other base maps are in course of publication of North Carolina, Wisconsin, Michigan, Connecticut, Massachusetts, Rhode Island, Tennessee, Alabama, Wyoming, New York, Pennsylvania and Florida.

The complete base material has been compiled for Sheets L-15, K-16, K-17, K-18, J-18, I-16, I-18, H-16, H-17 and G-17; these are indicated on the accompanying map by marginal shading. In their manuscript form these sheets still lack relief. This element is compiled on the same scale as the base map, 1 : 500,000, not on the original drawing, however, but upon a lithograph of it. The original drawing is thus available for reproduction as a base map in whatever form desired. The relief and the base sheets are then each reduced to the scale of 1 : 1,000,000, engraved and combined to form a complete sheet of the International Map.

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* Subsequent reports of progress are given in the Thirtieth Report, p. 88, the Thirty-First Report, p. 89, and the Thirty-Second Report, p. 122

† The legend on the accompanying map should correspondingly be corrected to read under (b): "Base sheets (scale 1:500,000) of the International Map completed, but not yet published."

‡ These are sold by the Survey at the following prices: Vermont, 10 cts.; Indiana, 15 cts.; Iowa and Mississippi, 20 cts. each; Illinois and Georgia, 25 cts. each; Minnesota, 40 cts.

The compilation of the United States portion of the International Map is rendered difficult by the lack of uniform sources. For the five-eighths of the United States of which no topographic sheets exist use is made of various sources. An important source are the numerous maps accompanying the publications of the Survey itself and of the organizations of which it is an outgrowth, as well as of the various state geological surveys. For the thirty odd public land states the maps of the General Land Office are available. The state maps on the scale of 1:760,320 issued by this office are not used in the compilation: reference is made to the township plats and the original maps on a larger scale. Where no other material is available recourse is had to county maps and atlases. Railroad profiles supplement the elevations determined by the Geological and the Coast and Geodetic Survey. The coast line is taken from the detailed charts published by the latter organization, and the ocean floor bordering the continent is compiled from the soundings on the charts both of the Coast and Geodetic Survey and of the Hydrographic Office.

It is this relative inaccessibility of the source material, coupled with the relatively large scale of the map and the requirement that certain elements, notably relief, be represented on it, which make the publication of this map of the United States so important. The best general maps of the United States heretofore available, those in such standard atlases as the Stieler, the Andree, the Vivien de St. Martin, although thoroughly scientific compilations, could not, because of their necessarily small scale, satisfy the geographer's every need. A general large-scale map of the United States has been a long-felt want.

How admirably the present map fills this need is evident from a perusal of the sheet just published.* For the first time a representation of real geographic value is here available of so important a part of the United States as central eastern New England. Although belonging to the oldest settled portion of the country, a part of the territory shown on this sheet is here even represented adequately for the first time, irrespective of scale. This is New Hampshire, between 43° and 44° N. Of this region, which includes the southern part of the White Mountains, no topographic sheets, except the Winnepesaukee and Dover sheets, exist, and no generally accessible representation with an adequate treatment of relief has been available. The main source of information in the compilation of this district was the

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* Sold by the Survey at 40 cts.

Atlas of New Hampshire on the scale of 2½ miles to the inch by C. H. Hitchcock, the head of the former geological survey of that state. In the representation on the new sheet of relief below 100 meters, furthermore, the Survey has fortunately made use of the latitude allowed by the international agreement[*] and added the 50 meter contour. A striking element of the sheet is the representation of the ocean floor. The consistent use of the 100 meter interval for the isobaths has produced a clearer picture of the continental shelf in this region than any other heretofore available. Additional valuable elements represented on this sheet which are not generally shown on maps of this nature are: main roads, electric railways, and two classes of railroads, distinction being made between single and double or more track railroads. In the representation of railroads, whose anthropogeographic importance was recognized in the international agreement by requiring this very distinction, the use of a heavier line, even if not as heavy as that shown on the model sheet accompanying the international agreement (cf. *Geogr. Journ., ut supra*), might have been of advantage. The choice of a conventional symbol, too, for cities of less than 500,000 inhabitants may, especially in the case of our extensive American cities, lead to misconceptions. Thus the area between Cambridge and Boston appears uninhabited. This fact, too, together with the unfortunate selection of the State Capitol as the center of the circle representing it makes Providence, R. I., appear an inland city with its nucleus lying to the north, instead of to the south, of the Union Station. These geographic anomalies would be obviated by actually representing the built-up areas, by shading, for instance. The examples cited prove that such a representation is not beyond the range of expression of the map as determined by its scale.

These slight defects are entirely secondary, however, and in no way detract from the fundamental importance and value of the map. As has been seen, many of the valuable features of the map are due to the excellent requirements of the international agreement (mainly, let it be repeated, the one making obligatory the representation of relief by hypsometric coloring) which cannot but guarantee its high geographic quality. But it is equally true that the excellence of Sheet North K-19 is due in no small measure to the efficient work of the Geological Survey. A comparison of this sheet with the other sheets hitherto published, North K-35, M-31, O-29, O-30 (the latter two preliminary proofs) and South H-34, without being invidious, will readily show this. The representation of all isobaths at an interval of 100 meters compares favorably with their absence below 200 meters on sheets North K-35 and O-29, as does the maintenance of the 100 meter interval for contours up to 600 meters with the use of the 200 meter interval on sheets North O-29, O-30 and K-35. The technical reproduction, too, is worthy of high praise. In delicacy of execution it may well be considered the best among the sheets hitherto issued.

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[*] *Geogr. Journ.*, Vol. 36, 1910, pp. 179-184.

The publication of the first sheet of the map of the United States as a part of the International Map of the World will thus be seen to be a cause for congratulation on the part of the geographic world. Its completion within reasonable time and the maintenance of the standards set by its founders are insured by the high efficiency of the Geological Survey.

THE ORIGIN OF THE HIMALAYA MOUNTAINS*

The value of this paper lies in its application of mathematical analysis to the investigation of features of the earth's surface. The facts adduced from a consideration of the geodetic evidence applied to the genesis of the Himalayan uplift may, in the main, be summed up in the hypothetical existence of a sub-crustal rift that is possibly in the course of present widening towards the north.

The following are phenomena of observation:

1. A rock trough filled with alluvium traverses northern India.
2. The edges of the trough are parallel.
3. A line of deficient density, presumably in the sub-crust, is found to traverse the whole trough.
4. The earth's surface north of the trough is heavily wrinkled.
5. The surface of the trough is not wrinkled.
6. The mountain wrinkles north of the trough are compensated by deficiencies of density beneath them (but these deficiencies are not comparable in degree with the deficiency underlying the line just south of the base of the mountains).
7. The trends of the main granite ranges of the Himalayas, Karakoram, and Hindu Kush, as well as of the minor ranges, are parallel to the line of low density and to the edges of the alluvial belt.
8. The mountain folds north of the trough are overthrust towards the south.

The Indo-Gangetic alluvial belt is well defined. It separates the tertiary formations lying to the north from the pre-tertiary table-land forming the Indian peninsula. The parallelism of its edges constitutes a feature of particular interest. This is revealed on the map by the trend of the Himalayan, Hindu

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* On the Origin of the Himalaya Mountains. A Consideration of the Geodetic Evidence, by Colonel S. G. Burrard. 26 pp. Map. *Prof. Paper* No. 12, Survey of India, Calcutta, 1912.

Kush* Sulaiman and Kirthar ranges on the one hand and the similarly irregular course of the border line skirting the foot of the northerly outliers of the pre-tertiary continental relics. The recurrence of the same phenomenon farther west on the opposite shores of the Gulf of Oman and the Persian Gulf is even more remarkable. All southeastern Arabia can be geologically correlated to the Indian peninsula. The whole chain of mountains that rises on the border of Kurdistan and of Persia is a Tertiary uplift. So is the southerly extension of this chain in Beluchistan. The intervening sea corresponds to the Indo-Gangetic alluvial belt. The parallelism is well marked at Bendar Abbas and Cape Massandom. It does not appear to end at this region, however. Another alluvial belt extending almost to the Mediterranean forms the basin of the Euphrates and the Tigris. This basin is the zone of separation between the tertiary uplifts that converge in three great arcs at Mount Ararat and the pre-tertiary Arabian land mass. Each of these belts can furthermore be considered as links in a probable belt of fracture that encircles the globe, and a section of which extends uninterruptedly from the straits of Gibraltar through the Mediterranean, the Mesopotamian valley, the Persian Gulf, the Indian Ocean, the Indo-Gangetic alluvial plains and the Arrakan coast down to Sumatra.

The results of plumb-line observations in the Indo-Gangetic plains may be summarized as follows: the deflections of the plumb-line show most extraordinary variations all along the foot of the Himalayas. Between Kurseong and Jalpaiguri, in the Eastern Himalaya, for example, the deflection changes 45″ in 25 miles. This variation calculated from the uncompensated topographic features should be 25″. On Hayford's hypothesis of isostasy it should be 15″.

Again between Birond and Nimkar in the Central Himalayas the deflection of gravity changes 43″ at the foot of the mountains. This variation as deduced from topographic features and uncompensated is 31″. On Hayford's hypothesis of isostasy it is 13″.

Passing to the western Himalayas, it is found that the change in deflection between Dehra Dún and Kaliana is 30″ as observed. That deduced from topographic features is 29″, while the variation calculated on the Hayfordian hypothesis is 15″. The Himalayan foot is therefore characterized by the existence of a long line in which the change in deflection is actually much larger than it would be if the whole uplift were exercising its entire attraction uncompensated.

In discussing the meaning of the line of low density it is assumed that the Himalayas are isostatically compensated in accordance with Hayford's hypothesis. Considering the data from the typical stations of Kurseong and Jalpaiguri it is found that throughout 2,000 miles in length round the foot of the Himalayan mountains we have an unexplained change in deflection of 30″ in 25 miles.

The extraordinary rift in the deflections all along the foot of the Himalayas renders the consideration of Himalayan compensation very difficult. The effects of the rift are so great that they obliterate the effects of topography and isostasy.

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*The trend of the Hindu Kush Range mapped on Pl. II. of Colonel Burrard's paper does not coincide with its ordinary representation. It is usually shown as rectilinear instead of convex to the north as in this instance. It is assumed, of course, that the strike thus mapped is based on the work of the Indian Survey and that it hence merits preferably universal adoption. The argument, however, does not rest on the matter of the southerly concavity of any of these four main ranges. It rests on the parallelism of the edges of the alluvial belt. Thus viewed the constancy of this parallelism is unimpaired by the locus of the Hindu Kush represented on the above mentioned plate.

In the alluvial plains of northern India, the observed deflections are in opposition to both the topography and to the theory of isostasy. We have here:

Mean observed deflection.. 5″ south.
Mean topographic deflection.................................. 10″ north.
Mean Hayfordian deflection on the hypothesis of isostasy..... 1″ north.

The southerly deflections prevailing throughout the northern portion of the Peninsula cannot be accounted for by the hypothesis of isostasy nor can they be attributed to the topography. In the central portion, on the other hand, northerly deflections are met with which are less at variance with the results due to the topography.

The value of Colonel Burrard's work will be enhanced by a comparison of the relation between its results and the geology of the regions investigated. The subject of gravity anomalies in the United States has been investigated by Bowie* who found that, while they appear to be very small, they are related to the surface geologic formation. The study of the origin of any mountain chain, however, is necessarily subordinate to the collation of data afforded by all branches of human knowledge. Evidence based on results obtained along a determined line of observation is necessarily incomplete and must be supported by information derived from what may often appear to be a remote source. In the present instance, the mathematical factor introduced by geodetic computations may be said to impart weightier consideration than the tenor of the Suessian views which are based chiefly on tectonics and wherein the accumulated details refer to the larger features of the problem. A study of the physiography of the Himalayas would also probably throw further light on the genesis of the uplift. Particularly so if applied to the consideration of contemporary mountain-making agencies. More knowledge on the line of deficient density might also be obtained by geodetic observations at other points of the belt of fracture encircling the globe, especially in the northern West Indies and the Isthmus of Tehuantepec.

LEON DOMINIAN.

EMIL VON SYDOW AND THE DEVELOPMENT OF GERMAN SCHOOL CARTOGRAPHY

In the *Geographischer Anzeiger* for September, in connection with the centenary of his birth, an interesting summary is given of Emil von Sydow's influence on the development of school cartography in Germany. Born in 1812, he was trained for the army and received his officer's patent in 1830. During his studies he devoted himself especially to the geographical side of military science. This led to his appointment, three years later, as instructor of geography at the institution where he had received his training, the Military Academy at Erfurt. This position he occupied from 1833 to 1843.

He felt keenly the lack of adequate material for teaching geography, especially the lack of good wall maps. Unexpected success in the preparation of such maps in his spare hours encouraged him to approach Justus Perthes in

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* "Some Relations between Gravity Anomalies and the Geologic Formation in the United States," by W. Bowie. *Amer. Jour. of Sci.*, March, 1912, pp. 237-240.

Gotha, with a view to their reproduction. The firm undertook their publication, and thus began a phase of its activities which has grown to large proportions. As von Sydow's drawings were not suited for reproduction, new ones had to be prepared. This was done in part by trained cartographers of the firm. Von Sydow himself, however, using original material in the Perthes library, undertook the representation of relief. This he considered the most important element. His conception of the ideal wall map was that it should enable the student to reproduce from memory any profile desired through the country represented.

Twenty-four maps were planned for this series of wall maps, one for each continent as a whole and several for subdivisions of the continents. In 1838 the first map, that of Asia, was published. Shortly after, young von Sydow—he was only 26 years old—received a letter from Carl Ritter speaking highly of the new map. "By its excellent arrangement," he wrote, "by the simple yet forceful treatment of its essential elements, by the avoidance of unnecessary names and by its pleasing color scheme, the map gives the impression of a direct picture of nature rather than of a mere paper surface." Maps of Europe, Africa, North and South America together, and of the world, followed during the next two years. Of the special maps only Germany was ever published, in spite of the success with which the series met, as von Sydow had in the meantime turned to other work, the preparation of a school atlas.

This atlas was published under the title of "Methodischer Atlas für das wissenschaftliche Studium der Erdkunde" (1842-44). Its aim and the treatment of its subject-matter were the same as those of the wall maps. To obtain a faithful picture of the relief of the earth's surface, as on the wall maps, blue was used for drainage, brown for highlands and green for lowlands. The atlas consisted of 30 maps in two parts containing general maps of the continents and special maps of Europe. A supplement was added later of maps of regions of special interest, such as the West Indies, the Near East and India.

Although the atlas was very favorably received its relatively high price prevented it from being used in the schools as extensively as von Sydow wished. He therefore undertook the preparation of another atlas. This was published in 1847-49 under the title of "Schulatlas in 42 Blättern." Its success is attested by the fact that up to 1880 it had passed through 32 editions. In 1888 it was entirely revised by Hermann Wagner and has since been published under the well-known title of "von Sydow-Wagner: Methodischer Schulatlas."

The preparation of these atlases was undertaken while von Sydow was engaged in his regular military activities. Cartography was so dear to his heart, however, that when, in 1855, the firm of Perthes invited him to join its scientific staff, he resigned from the Military Examination Board and accepted.

For five years von Sydow was connected with the Gotha geographical institute. He completed the series of outline and mute maps, intended for use as base maps or for repetition, which he had begun in 1847. This series consisted of a "Gradnetzatlas" (1847), showing the map net only, a "Hydrographischer Atlas" (1847), showing in addition the drainage systems of the regions represented, an "Orographischer Atlas" (1855), showing relief, a "Hydrotopographischer Atlas" (1855), showing drainage and the location of towns, and an "Orohydrographischer Atlas" (1856), showing relief and drainage. The value of this series and the soundness of the pedagogical principles underlying its preparation is again attested by its re-publication under the editorship of Dr. Hermann Haack in revised form in 1907 after a lapse of sixty years.

It was also during his connection with the Gotha institute that von Sydow began that excellent survey of current European maps which he contributed to *Petermanns Mitteilungen* under the title of "Der kartographische Standpunkt Europas" from 1857 to 1872. This survey represented a new departure in geographical criticism. The irregularity and, in part, discontinuance of various later efforts along similar lines attest the unique fitness of von Sydow in this field and the difficulty of replacing him.

In 1860 von Sydow responded to the call to return to military life. He resumed his position as member of the Examining Board and as Professor of Military Geography at the Military Academy in Berlin. In 1867 he was appointed director of the Geographical-Statistical Section of the General Staff, with which organization he was associated until his death in 1873.

Although after his departure from Gotha von Sydow was no longer able to devote his time to school cartography, his methods had taken firm root in the Perthes institute and through it made their influence felt on the general development of school cartography in Germany. For it may be said that the recognition of the physical map as the basis of all geographic work and the representation of the relief of the earth's surface by means of the now standard colors, blue, green and brown, is the work of Emil von Sydow.

GEOGRAPHICAL RECORD

NORTH AMERICA

The Transcontinental Excursion of 1912. As a concise report on the Excursion will be published later, only a few special matters will be referred to here. The itinerary given in abstract in the September *Bulletin* (pp. 667-668) was adhered to in every particular with two exceptions: the return from Crater Lake on September 18 was made to Medford instead of to Klamath Falls (this change had already been decided upon before the departure of the Excursion); and the forced omission of St. Louis on October 8 because of a day lost through excessive rainfall at the Roosevelt Dam. Instead, the Excursion proceeded directly from Kansas City to Memphis, arriving there at the appointed time on October 9.

If the general impression made by the Excursion were to be summarized in a few words it would be to record the amazing number of distinct geographic types passed through in eight weeks. The wonder grew, especially among the European members, at the great variety of pictures that was constantly passing before their eyes. In this very rapidity of the changing scene lay the object-lesson of the Excursion, both to Europeans and Americans, namely the secret of the power of the nation that has by the vitality of its civilization knit together into one homogeneous whole, regions of such diverse geographical nature.

On the afternoons of October 17 and 18, meetings were held in the museum of the Hispanic Society of America at which papers were presented by a number of the European members. These papers, as well as others prepared by many of the foreign guests, will be published by the Society.

On the evening of October 17 a very enjoyable reception was given at the Society's house, with music by the Kneisel quartet and songs by Mr. Henry T. Burleigh. The Transcontinental Excursion ended with a dinner in honor of the European members at the Waldorf-Astoria on October 18. Before parting, each European member received a silver plaquette bearing a replica of the Society's building as a souvenir of the Excursion. The dinner was characterized by a spontaneity and informality that spoke of the ties of friendship that had grown up during the Excursion.

THE BRYANT EXPEDITION TO LABRADOR. The party included besides Mr. Bryant, President of the Geographical Society of Philadelphia, Mr. Russell W. Porter, topographer, two Newfoundland canoemen and two native guides. Three months, last summer, were spent in the exploration of the St. Augustine River, which enters the Gulf of St. Lawrence in Canadian Labrador. The party reached the Hudson Bay Company's post at the mouth of the river on July 6. On July 12 the ascent of the river was begun. Advancing in three canoes good progress was made, and on the fourth day the lower falls were reached, 55 miles from the mouth of the river. Its source was eventually attained in a lake on the Height of Land, 141 miles from the point where the stream enters the Gulf of St. Lawrence. Some time was spent in locating the Indian route of travel across the watershed. One of the canoemen had previously injured his knee and his condition obliged the party to return to the mouth of the river, which was reached on Aug. 23. According to *The Bulletin of the Geographical Society of Philadelphia* for October, 1912, Mr. Bryant's party was the first to ascend and correctly map this important river.

In addition to the geographical work accomplished, geological and entomological collections were made and photographs secured illustrating parts of the interior heretofore unvisited by white men.

OPENING OF LIVINGSTONE CHANNEL. The formal opening of the Livingstone Channel, 12 miles in length, through the shoal waters of Limekiln Crossing at the mouth of the Detroit River, occurred on October 19. This deep channel has been excavated through solid limestone and affords a straight and safe passage for the immense vessel traffic of the Great Lakes. The channel, 4⅘ miles of which lie in Canadian waters, has been some years under construction by the U. S. Government at a cost of about $10,000.000. Before its completion it was a constant menace to navigation. It is expected by shipowners that the next session of the Canadian Parliament will provide for constructing a channel on the Canadian side of Fighting Island, the estimated cost of which is not high, as excavation would be in earth. The work of widening Ballard's reef channel will be completed next season. (*Daily Cons. and Trade Rep., No. 260, 1912.*)

RELATION OF CLIMATE TO AGRICULTURE IN WISCONSIN. The University of Wisconsin Agricultural Experiment Station has issued *Bull.* 223, "The Climate of Wisconsin and its Relation to Agriculture," by Prof. A. R. Whitson and Mr. O. E. Baker. The bulletin contains excellent geographical material such as climatic maps both of the United States and of Wisconsin. The climatic influence of Lakes Michigan and Superior, of the Mississippi River valley and other river valleys comes out plainly. The small relief of Wisconsin is reflected in the slight variations of temperature due to difference in altitude; in no case does difference in altitude alone cause more than 2.5° F. difference in mean annual temperature. So marked is the influence of Lake Michigan upon the climate of the adjacent land that the mean winter temperature at the southernmost point of the state varies only 2° F. from that at the north end of the Door County peninsula. The effect of the lake in retarding spring is equally noticeable. Along the Mississippi River spring comes earlier than at corresponding latitudes on the shore of Lake Michigan.

The authors point out that, as far as crops are concerned, the temperatures above 42° F. are the ones which give "effective heat." While the valleys of the Rock and Mississippi rivers get a daily average of 20° F. of effective heat during the six growing months (April-September), the northern uplands get only three-fourths as much.

As a whole, Wisconsin experiences a very wide range of temperature. The average yearly range at Milwaukee is 107° F. At Barron, in the northwestern part of the state, it attains 129° F. The lowest temperature recorded is —50° F. and the highest 111° F., making an absolute range of 161° F.

The length of the growing season period (period between killing frosts) varies greatly from south to north, ranging from 175 days in the southwest to 75 days in the northern interior. The length of the former is that of the growing season in the Valley of Virginia; of the latter, that of parts of Saskatchewan and Alaska. Nearly 70 per cent. of the rainfall comes from April to September, when it can do most good to crops and pastures. The average snowfall for the whole state is not far from four feet a year.

Under the head of "Climatic Provinces" the authors list eight sections of the state, corresponding to the principal valleys, highlands and lake-shore strips. They point out that, while the influence of Lake Superior upon climate is very noticeable, as a factor in fruit growing, the influence does not extend over five miles inland. Maps show the relationship between climate, crops and dairying. Cheese factories are almost wholly confined to the region whose growing season is less than 150 days, while butter factories prevail in the corn belt, where the growing season exceeds 150 days. The two choice fruit-growing districts are two peninsulas, Door County peninsula extending into Lake Michigan and Bayfield peninsula, extending into Lake Superior.

R. H. WHITBECK.

CENTRAL AMERICA

A SOCIETY FOR SEISMOLOGICAL OBSERVATION IN COSTA RICA. This association was formed immediately after the intense seismic activity of 1910. Its object is to gather under one head the data collected by observers throughout the republic and to inaugurate a series of more systematic observation of the seismic and volcanic phenomena in Costa Rica. It will be known as the "Centro de Estudio Sismológicos." Its founders are Lic. Cleto González Víquez, former President of Costa Rica; Don Anastasio Alfaro, Director of the National Museum; Dr. Gustavo Michaud, Director of the Laboratory of Commercial Chemistry; Don Pablo Biolley, superintendent of the seismological service of the National Observatory; Professor Juan Rudin; Don Eliás Leiva; Don Higinio Cots; Don César Cots, and Don J. Fidel Tristán.

Stations have been established at San José, Heredia, Alajuela, San Carlos, Barra del Colorado and Puntarenas. Correspondents have also been appointed at Las Cañas, Liberia, Nicoya, Curridabat and Limón. The results of observation and study will be published in the "Anales del Centro de Estudios Sismológicos de Costa Rica," the first number of which was published at the beginning of this year.

SOUTH AMERICA

MEANS OF COMMUNICATION IN COLOMBIA. The main artery of communication is the Magdalena River, navigable for shallow-draught and stern-wheel steamers as far as La Dorada, 600 miles from its mouth and not more than 600 feet above sea-level. The detritus carried down from the upper river is undoubtedly silting up the river in its lower course. The friable nature of the soil in places increases the evil, which is further emphasized by the washing out of trees which encumber the river-bed and present serious obstacles to navigation. The fluvial tax of $2.50 per ton, charged on all merchandise carried on the river, if applied to the dredging and clearing of a navigable channel, would render navigation possible. In dry seasons a journey of six to eight days is often prolonged to twice that number and may be indefinitely delayed by the grounding of the steamer on a sandbank, where it remains until the river rises. This condition of affairs reached a climax at the end of 1911 and the beginning of 1912, when drought reduced the river-level by several feet below normal and almost caused the total suspension of the river traffic.

In Colombia there were, at the end of 1911, only 600 miles of railroad in operation. This total is made up of 12 distinct lines. Of these three unite, or are destined to unite, the adjacent Atlantic ports of Puerto Colombia, Cartagena and Santa Marta with the Magdalena River above the bar which obstructs its mouth to ocean-going steamers.

Failing river and railway communication, Columbia relies largely upon horse or mule transport, which is indeed the only practical means of locomotion in the mountain districts. The best road in the country is the Great Central North Road, a macadamized road which, when completed, will lead from Bogotá to Cúcuta, near the Venezuelan frontier, via Tunja, Toata, and Pamplona. (Condensed from *Board of Trade Journal*, Vol. 78, 1912, No. 813, p. 691.)

New Lighthouses in Peru. Two new lighthouses, with flashlights, have been put in service off the North Peruvian coast since Sept. 24, 1912. Built on the Lobos de Tierra and Lobos de Afuera islands respectively, they are mounted on white, conical towers on the highest points of the islands. The Lobos de Tierra light is 73.6 meters above sea-level and is visible for 23 miles to an observer 6 meters above the water. The Lobos de Afuera light is 99.32 meters above the sea and is visible for 26 miles to an observer 6 meters above the water. (*Peru To-day,* Aug., 1912.)

A New Chilean Publication. Chile has a new monthly devoted to the industrial and economic development of forestry, fishery and hunting. It has been issued since July by the "Inspeccion General de Bosques, Pesca i Caza" at Santiago, and its title is *Boletin de Bosques, Pesca i Caza.* Special attention will be paid to the conservation of natural resources within the scope of these departments; also to the preservation of national, and the acclimatation of foreign species. Señor Félix Pinto Ovalle is the editor.

The Argentine Meteorological Service. The Argentine Weather Service was established by the late Dr. B. A. Gould in 1872, and the results of the observations up to the date of his retirement were printed in four large quarto volumes. The Service was continued along the same lines by the present Director, Mr. Walter G. Davis, until 1900. The first daily weather map was published in 1902. Forecasts are issued for thirty-six hours in advance. The daily weather maps show the conditions existing from Para (Brazil) to the southernmost limits of Argentina, extending over 55° of latitude. In addition to the central station at Buenos Aires, there are two principal observatories, at Cordova and at Chacarita, where special researches are carried on. A fully equipped meteorological and magnetic station is maintained at South Orkney, in latitude 61° S. The work of the meteorological office includes a seismological service, and this will soon embrace a line of stations along practically the whole of the north to south extent of the Republic. A hydrometric service and a magnetic service are also included. At the present time the Argentine Weather Service embraces 35 first order, 156 second order, 10 third order, and 1,600 rain-gauge stations. All of these are within Argentina and Paraguay. Observations are received daily from 12 stations in Brazil, 10 stations in Chile, and 6 stations in Uruguay ("The Argentine Meteorological Office," by Walter G. Davis.) *Symon's Met. Mag.,* April, 1912. R. DeC. Ward.

AFRICA

A French Scientific Expedition to Morocco. A party of well-known specialists will shortly be sent to explore Morocco under the auspices of the Société Géographique de Paris aided by the Académie des Sciences, the Musée d'Histoire Naturelle and various banking institutions. According to the *Bulletin* of the Società Geografica Italiana for October, 1912, L. Gentil, whose work on Moroccan geology is well known, will have charge of the geology and mineralogy. Mr. Bauguil, the director of the Algerian veterinary department, will be in charge of agronomy. Mr. Pallary, who has devoted himself for fifteen years to the study of Moroccan fauna, will carry on further zoological research. The flora of the Chaouïa will be investigated by Prof. J. Pitard of Tours. These investigations are expected to last four or five years. They may be prolonged provided the necessary funds are raised by the Société Géographique de Paris. The results obtained will be published at the end of each year's work.

Results of the Segonzac Moroccan Expedition. The Sebu basin, in North Morocco, has been surveyed, as well as the valleys of the Wadis Rdem, Beth and Remel. The surveys show that the course of the Sebu is exceedingly sinuous in the region of its headwaters. A section of this meandering waterway revealed in one instance a curved bed 7 kilometers in length, the extremities of which were hardly a few meters apart. Despite the resulting inconvenience to navigation it was ascertained that the river is practically navigable throughout the whole year except in the vicinity of Mesra and Ksiri. In the neighborhood of Melaina only nine months of river navigation can be counted upon. It was also found that the harbor of Mehedia, at the mouth of the Sebu, has natural advantages that are lacking, for example, at Larash, farther north. Its depth of 3 meters would permit vessels of 1,000 tons to steam up the river. Farther inland the river port of Knitra was found to be susceptible of improvement. The Sebu here attains a depth of 5 to 6 meters along a section 4 kilometers in length, with low banks on either side.

The valley of the Rdem appears to be the most fertile of the basin, although the entire region explored seemed promising in this respect. According to the *Boll. Soc. Geogr. Ital.* for Oct. 1, 1912, the results obtained by the expedition will be issued in final form about January, 1913.

A NEW TILHO MISSION TO LAKE CHAD. Captain Tilho left France in June for the Chad district, where he is to replace Commandant Colonna de Leca. In addition to his military and administrative duties, Captain Tilho has been entrusted by the Académie des Inscriptions et Belles-Lettres, with the task of discovering the former course of the waterway connecting the Chad and Nile basins. He will also study the application of wireless telegraphy to the determination of astronomic positions in the field, and establish a triangulation framework to be used as a base for topographic surveys undertaken by officers stationed in the Chad district. This work will eventually result in a map similar to that of the region between the Niger and Lake Chad accompanying the reports of Captain Tilho's noted mission. (*Rev. Franc. de l'Etr. et des Col.*, October, 1912, p. 604.)

WHITE POPULATION OF THE BELGIAN CONGO. The census of the white population of the Belgian Congo, taken by the Government on Jan. 1, 1911, revealed a total of 4,003 individuals. Of these 2,432 were Belgians, 311 English, 215 Italians, 197 Portuguese, 188 Swedes, 121 Dutch, 88 Germans, 77 French, 71 Swiss and 62 Russians. The white population of the Katanga district comprised 747 Europeans, among which 313 were Belgians and 203 English. (*Mouv. Géogr.*, June 9, 1912.)

SURVEY OF THE NORTHEASTERN BOUNDARY OF THE BELGIAN CONGO. The survey of this section of the border of the Belgian colony was begun in 1900 as a result of a boundary dispute between the Belgian and German authorities. The English Government subsequently took part, both in the negotiations and the surveys, which were carried on intermittently until 1911. The first six years of this period were spent by the engineers in the Rusisi-Kivu region. The next two years were devoted to the district adjoining the 30th meridian east of Greenwich. A lull in the operations then ensued until 1911, when the Kivu-Mfumbiro survey was begun. The completion of work on this last section also marks the end of the whole task. The results of this undertaking consist in the establishment of a triangulation network extending over a length of 530 kilometers between latitude 1°18′ N. and 1°29′ S. The course of the Rusisi was determined during the first period. The location of the principal mountains in its valley was also ascertained. The western and northwestern shores of Lake Kivu were mapped. The cartographic output was a map of the Rusisi River on a scale of 1:200,000 and a map of Lake Kivu on 1:100,000.

The survey of the region along the 30th meridian was begun in 1903. In 1906 the two surveys were connected by a system of triangulation which connected the Rusisi-Kivu net to a conspicuous summit of Mt. Ihunga. This uplift is a remarkable feature of the topography of the region in which the British, German and Belgian boundaries meet. A triangulation base was also established in the region between 1° N. and 1° S. This served as a skeleton for a map on 1:250,000 of the district along this meridian and between these parallels.

The purely scientific work accomplished consisted in measuring an arc of the meridian from 1° N. to 1° S., and the determination of gravity anomalies. According to a statement by J. Maury in the course of a lecture delivered at Brussels on Jan. 10, 1912, and before the Société Belge des Ingénieurs et des Industriels, the results of this work are to be published both in English and in French.

Divergencies between the British and Belgian Governments caused suspension of the work in 1909. Early in 1910 a commission composed of British, Belgian and German delegates met in Brussels for the purpose of settling this matter definitely. It was decided to adopt a preliminary boundary line starting at a point 0°54′03″ S.; 29°35′14″ E., on Mt. Ngabua and ending at the extinct peak of Mt. Sabyino. This boundary was then extended over the chain of volcanic peaks attaining Karissimbi and thence to a point on the northern shore of Lake Kivu. A party made up of British, German and Belgian surveyors took the field once more for this final determination. The Ngabua-Kivu triangulation base is one of the results obtained by this party. A map on 1 : 200,000 of the Ruchuru valley between 1° S. and the Sabyino parallel was also prepared as well as a 1 : 100,000 map of the German-Belgian frontier between Lake Kivu and Mt. Hehu.

AUSTRALASIA AND OCEANIA

Exploration of German New Guinea. According to information covering the period ending May 15, the expedition under the leadership of Dr. Stollé which was organized by the German Colonial Office and the German Colonial Society to explore the Kaiserin Augusta R., established its main camp in the Hunstein Mountains, above the village of Malu, which lies 270 miles from the mouth of the river (*Geogr. Anz.*, Sept., 1912, reprinted from *Deutsche Kolonialzeitung*, No. 29). An advance party of the expedition had penetrated 115 miles farther upstream to the mouth of the Frieda R., a tributary. Dr. W. Behrmann, geographer of the expedition, had previously traversed the Gazelle Peninsula by a new route. This peninsula consists of a plateau, 1,000 to 1,300 feet high, which has been formed by the ejecta of the volcanoes which rise above it to a height of 2,000 feet above sea level. Dr. Behrmann established a meteorological station on the Sattelberg near Finschhafen. This is the first institution of its kind in German New Guinea.

Rainfall of Australia. The Australian Central Weather Bureau has issued (under date of Sept. 25, 1911), an average rainfall map of South Australia and the Northern Territory. A "memorandum," prepared by Mr. H. A. Hunt, Commonwealth Meterologist, accompanies the map. Only stations with at least fifteen years' records have been used, and all data have been revised up to the end of 1910. The chart shows clearly the rapid decrease of the rainfall from the agricultural areas northwards to the interior, where, in the Lake Eyre basin, the average rainfall is under five inches. The area in square miles in which the fall is under 10 inches is given as 317,600 in South Australia and 138,190 in the Northern Territory. In the latter district the mean annual rainfall is given as 24.65 inches, ranging from 62.12 (at Port Darwin) to 5.54 inches; in the Pastoral Interior 7.26 inches, ranging from 12.99 inches to 3.79 inches; in the agricultural settled districts 18.93 inches, varying from 46.99 (at Stirling West) to 7.12 inches. The line (14-16 inches) representing the limit of safe agriculture is plotted on the map.

The Australian Weather Bureau has also issued, in the form of a picture postcard, an average rainfall map of the Commonwealth, together with a table showing the comparison between the total area of the United Kingdom and the different rainfall areas shown by grades on the rainfall map of Australia.

R. DeC. Ward.

Mr. Churchill's Polynesian Work. With the recent publication of the third volume of his series upon the speech of the Polynesian Pacific Mr. William Churchill is at the middle point of the major project which he is prosecuting with the approval and assistance, so far as relates to publication, of the Carnegie Institution of Washington.

In the first volume of the series the author essayed to clear away the linguistic problems which probably fall within the traverse of the Polynesian race out of Indonesia and into the Pacific. In the course of these particular studies he was able to mass proof of the distinct migrations of two stems of the race which migrated at wide intervals of time and first came together in Samoa, the Proto-Samoan and the Tongafiti migrations. Of the former he traced the voyages as far as Samoa in two traverses through Melanesia, emerging from the Malay Archipelago respectively north of New Guinea and south through the Arafura Sea and Torres Straits. In this work, "The Polynesian Wanderings," he established on linguistic grounds the dissociation of the accepted family of Malayo-Polynesians and settled the problems of Polynesian speech anterior to its settlement in the mid-Pacific.

The second work of the series, a monograph on the Beach-la-Mar jargon, dealt with certain minor linguistic characters which were found essential to the proper establishment of the character of the Polynesian as a simple isolating speech.

In the third work, the dictionary of Easter Island, Mr. Churchill has dealt with the Proto-Samoan element in its further migration eastward. Thus, westward and eastward, effectively earlier than the Samoan settlement and later, the loose ends have been disentangled.. Now the author is at the point where he may approach the central theme, the analytical study of modern Polynesian and its ancient source language. This will be effected through the means of a dictionary of Samoan with full philological apparatus covering the other languages of the family. To accomplish this dictionary it is necessary to publish Mr. Churchill's manuscript collections of Samoan myth and legend.

Upon this collection the author is at present engaged and has already made considerable advance. The material will fall little, if any, short of a million words and will amount to a thesaurus of Samoan literature. The first section of this work is already completed. It deals with the genealogies of Samoan families, and amounts in text and translation to 170,000 words. These records, several of which naïvely run back some half dozen generations anterior to "the creation of god," are of the utmost importance in the establishment of the chronometry of the race.

Another section, already advanced in treatment, will probably extend to about the same number of words. This is the manual of courtesy, a most remarkable feature of the life of savages. It is in a measure a Who's Who in Savagery, for it records for each Samoan hamlet the proper phrases of ritual address to be employed to each chief, it sets down the name of his house, of the place of deliberation of his tribe, the name called aloud when his kava is served, the title of his son and of his daughter.

A third section will be made up of the myth of the Samoans interlaced with history which it will be the end of this study to establish so far as values are ascertainable. The fourth section, separated only for motives of convenience in study, will contain similar material occurring in metrical form. It is hoped that the whole work, with accompanying monographs, may be completed in about a year and find publication in 1914.

EUROPE

Mapping by the British Ordnance Survey. According to "Report of Progress of the Ordnance Survey to March 31, 1912," there is no portion of the world's surface, of a similar area, which has been so minutely surveyed as the hundred and twenty thousand square miles which comprise the United Kingdom. The 1-inch ordnance map has been completed as well as revised twice, and the map will undergo a process of continuous revision so that none of the sheets will be over fifteen years out of date when issued to the public. The 6-inch and 25-inch maps of Great Britain have been completed as well as revised once. The same is true of the 6-inch map of Ireland. The 25-inch map of this island was begun during 1911-1912 and will be finished in 1914. It is also planned that the revision of the 25-inch map of the United Kingdom shall be continuous in such a way that each sheet shall be revised once in 20 years. The revision includes that of the vertical framework, that is of the levelling, and also the keeping in repair of the horizontal framework or triangulation. It also provides more points wherever required. In addition to the above, ½-inch maps on the layer system are being prepared by the Ordnance survey. It was ascertained that the hypsometric coloring used on these maps found ready favor with the officers. The first revision of the ¼-inch map of England is almost finished and more than half of the ¼-inch map of Scotland has been once revised.

WIDENING THE KIEL CANAL. The increasing size of steamships has necessitated widening this waterway to almost twice its capacity. According to the new plans the canal will have a section of 825 square meters, instead of 413 square meters. The terminal locks will be replaced by the two largest in the world, not excepting those at the Canal Zone. These locks will be 330 meters long, 45 meters wide and 13.77 meters deep. Construction work is now being carried on without hindrance to navigation. The widened canal will be completed by 1915. (*Le Tour de Monde,* Oct. 5, 1912.)

THE BULLETIN OF THE SERVIAN GEOGRAPHICAL SOCIETY. The Servian Geographical Society, founded in Belgrade in 1910, has issued the first number of its *Bulletin* (*Glasnik Srpskog Geografskog Drushtva*), which will be issued twice a year. Its form is large octavo, the first number containing 151 pp., with a supplement in French announcing the *Bulletin* programme and giving an abstract of each of the leading papers. These supplements will be bound with the copies of the *Bulletin* sent to foreign lands. The editors are Dr. J. Cvijić, professor of Geography at the Royal Servian High School, and Dr. Paul Vujevic, professor of Climatology and Meteorology at the University of Belgrade. The publication will be especially devoted to the geography of the Balkan Peninsula and neighboring lands, investigations of their physical phenomena, geographical theories and scientific methods, a bibliography of studies in geography and its allied sciences relating to the peninsula and a record of the work and proceedings of the Servian Geographical Society. The first number is handsomely produced and is illustrated by half-tone engravings, diagrams and sketch maps.

ARCTIC

DR. DE QUERVAIN'S TRIP ACROSS THE GREENLAND ICE-CAP. The expedition consisted in addition to Dr. Quervain of six Swiss savants. It started with twenty-nine dogs, three sleds and ten Eskimo bearers. The first difficulty was the reluctance of the bearers to persevere in the venture. They promised to accompany the party for five days, but one by one they deserted. One only stuck through the whole journey.

The ascent toward the interior plateau took ten days, and, on June 20, the expedition began the real journey of crossing the ice wastes. At first they travelled only sixteen miles a day with a view to sparing the dogs. There were tremendous ice crevasses all around. They were in the most dangerous part when suddenly, while on the thin ice of an inland lake, the whole expedition was immersed. On emerging they found that their clothing had been frozen stiff, but fortunately only some of their provisions had been lost.

Gradually the dog marches were extended to twenty-eight miles a day. They were frequently almost overwhelmed by fierce blizzards. The highest point, 8,330 feet above the level of the sea, was reached on July 12. This was in longitude 41°42′ west, latitude 67°23′ north.

Meanwhile the expedition had touched Peary's and Nordensjöld's tracks. It was ascertained that Nordensjöld's Laplanders had not gone so far as had been stated. Their high records did not tally with the facts.

To the northward of Sermilik fiord a great, new mountainous region was located and christened Switzerland. The highest peak seen, 9,200 feet above sea level, was named Mount Forel. It is the second highest peak in Greenland. At this time a new danger threatened the expedition. The food cache on the east coast could not be located owing to an error of the map, but fortunately Angmagsalik was not far away.

Dr. Quervain says the inland ice is not so regular in its formation as has hitherto been assumed. The lowest temperature encountered was —23°. Flora was absent, but birds were located as far as 41° W. Long. The dogs behaved excellently and it was with sorrow that they were slaughtered, but this had to be done as they would not be allowed to enter Angmagsalik. Dr. Quervain is convinced that the dogs are better for this sort of work than the ponies which Captain Koch proposes to use in his expedition. (*The Sun,* Oct. 4, 1912.)

GENERAL

A NEW EDITION OF THE "ATLAS UNIVERSEL DE GÉOGRAPHIE." At the meeting of June 7, 1912, of the Société de Géographie, Mr. Shrader announced that the second edition of the Atlas edited by himself is in an advanced stage of completion. The revision of this new edition is facilitated by the excellence of the original work.

A NEW PERIODICAL ON INTERNATIONAL ECONOMICS. A new periodical on international economics entitled "*Weltwirtschaftliches Archiv.-Zeitschrift für allgemeine und spezielle Weltwirtschaftslehre,*" will appear in 1913. It will be edited by Dr. Bernhard Harms, professor of political economy at the "Staatswissenschaftliches Institut" of the University of Kiel, Germany. Its chief aim will be to create a central organ, in which all branches of modern international economics, such as exchange of products, migration of capital, international enterprises, etc., may be discussed from a purely scientific standpoint, theoretically as well as practically. Special stress will be placed upon the exposition of the actual facts and the theoretical analysis of the causes and effects of international economy. New books and papers, bearing on subjects appropriate to the magazine, will be reviewed. The editor is a prominent German scholar. He is well known through his book on "Volkswirtschaft und Weltwirtschaft" (1911). He is now writing a work on Canada from the economic viewpoint. His name guarantees a first-class publication.

CHARLES L. HENNING.

THE WINDS OF THE UNITED STATES. In his recent paper (The Winds of the United States and their Economic Uses. *Yearbook, Dept. of Agric. for 1911,* pp. 337-350. Washington, 1912), Mr. P. C. Day rightly says that there is need of a compilation of the available data "in convenient form for ready reference by those interested in the study of the winds, either in scientific investigations or in the practical application of their energy to serve our everyday needs." The present account is a summary of a larger monograph on the same subject which Mr. Day has in hand for publication as a *Bulletin* of the Weather Bureau. On the basis of observations for the 20-year period 1891-1910, inclusive, charts have been constructed showing the average hourly velocities of the wind and its direction, for special months and hours of the day. Diagrams are also given showing the daily march of the winds and their variations at different levels. The somewhat difficult question of changes in velocity due to elevation has been carefully considered in constructing the new charts. The high and favorably distributed wind velocities over the Great Plains, which was clearly brought out by Dr. Frank Waldo some fifteen years ago, appears very markedly on Mr. Day's charts. Emphasis is laid upon some of the economic aspects of wind movement, attention being drawn to the localities favorable for the use of windmills; to devices for obtaining electrical energy from wind power, and to the relation of the winds to aviation. Those who are interested in the more thorough study of American climatology will look forward with pleasure to Mr. Day's complete report. R. DEC. WARD.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

Three Wonderlands of the American West. By Thos. D. Murphy. Pictures by Thos. Moran. 180 pp. Index. L. C. Page & Co., Boston, 1912. $3. 9½ x 6½.

This is a narrative of the author's personal experience, in which the "See America first" slogan is tenaciously sounded. The prospective traveler about to tread the author's trails will obtain in these accounts a preliminary idea of the regions to be visited. Whether his goal be the Yellowstone National Park, the Yosemite Valley or the Grand Canyon he will undoubtedly be able to store preparatory knowledge that will help him to observe with greater accuracy.

The book has no claim to scientific worth. Its value would in no wise have been impaired had the attempt to give an idea of the geological agencies once at play in the Yosemite or the Grand Canyon been omitted.

Pike's Peak, the Garden of the Gods, and other noteworthy Colorado sites are briefly mentioned. Allusion is also made to some ancient Californian cloisters. A set of superb duogravures enlivens the text and helps impart a certain sense of the majestic grandeur of the scenery set before the reader's eyes. The same cannot be said of the color reproductions from original paintings. Fortunately the painter's reputation need not be founded on the riotous display intended to interpret his work. The present reviewer having trodden over the author's paths finds it hard to reconcile his retrospective thoughts of gorgeous yet sober coloring with the somewhat gaudy hues printed on these color plates.

LEON DOMINIAN.

SOUTH AMERICA

A Study of the Question of Boundaries between the Republics of Peru and Ecuador. By Don Vicente Santamaría de Paredes. Translated by Harry Weston Van Dyke. 336 pp. Map. Byron S. Adams, Washington, D. C., 1910. 9½ x 6½.

The strictly legal aspect of this political question is discussed in this work. The English edition before us is a translation from the original Spanish. It is an excellent study of some phases of the transition of Latin-American states from the colonial régime to the stage of national independence. The author has divided his discussion into two parts. The General Part comprises the antecedents and history of the boundary question, while the diverse questions embraced therein form the subject matter of a Special Part. The data and events recorded follow in chronological sequence, thereby facilitating thorough mastering of the case.

Although the book is meant for the jurist, the layman will find much of interest in the historical review of the insurrectionary movement leading to the formation of the Spanish-American states. An account of the origin of the so-called "Spanish-American public law" is also given. This law is taken as forming the legal basis to be adopted in the settlement of the points at issue.

The Special Part is subdivided into two sections dealing with the intercolonial and international boundaries. The successive modifications of the political geography of that section of South America since the dawn of the XIXth century are reviewed. The evidence from all of the aforesaid considerations are resumed in 43 articles from which it is concluded "that the frontier between Peru and Ecuador ought to be so established as to leave within Peru the littoral provinces of Tombes, the Department of Piura, the province of Jaén and that which was the Gobierno and Commandancia General of Maynas." LEON DOMINIAN.

The Incas of Peru. By Sir Clements R. Markham. xvi and 443 pp. Map, ills., index. E. P. Dutton & Co., New York, 1910. $3. 8½ x 5½.

After a lifetime greater than is granted to most men it is interesting to find that Sir Clements Markham recurs in his age to the theme which first turned his thoughts to geographical research. It would be supererogation to comment upon the services to geography which the author has rendered unstintingly, yet it seems almost valedictory when we find him returning to complete the study which as midshipman he began more than sixty years ago. This work shows no flagging of zeal, its characterizations are as fresh as if written in the author's prime—truly an old man who knows not age save by reference to the calendar.

The study of the Inca culture is intimate. We are filled with amazement that the writer can describe with such fullness of detail and intimacy of observation spots upon which his eyes last rested fifty years ago. Others have written about the Incas, and there is no inconsiderable library on Peru. But one chapter is Sir Clements Markham's own, the drama of Ollantay. In this volume he gives the story of how he became aware of the existence of a manuscript in the hands of a devout descendant of the Incas in a remote mountain valley, of how he was successful in his search, and now he offers a translation which carries the spirit of the original. WILLIAM CHURCHILL.

AFRICA

The Niger and the West Sudan, or the West African's Note Book. A *Vade Mecum* containing hints and suggestions as to what is required by Britons in West Africa, together with historical and anthropological notes, and easy Hausa phrases used in everyday conversation. By Captain A. J. N. Tremearne. 151 pp. George H. Doran Co., New York, 1910(?). $2. 9½ x 6.

The book is a guide for persons bound for western Africa. It fulfills its purpose well. In addition to historical sketches of the various colonies, and compilations of facts and theories as to the origin, relations, and customs of the native races, it contains "hints and suggestions" filling one-third of the book. Appendices give (1) official salary lists, and (2) fairly complete lists of equipment, with costs needed for West African travel, camping and exploring.

The West Coast, with its gold, ivory, game and adventure, is awarded very low rank as a health resort. The author emphasizes the growing conviction that European and American culture as at present grafted on African culture is not the best combination for all concerned. To be taught to work systematically, consistently, intelligently, is the chief need of the negro; not necessarily to wear clothes, to eat cooked meat, drink beer, and adopt European standards of life.

The Gambia River and travel thereon are described; likewise horseback and hammock traveling. The latter is far preferable, because of the comforts possible and the lesser degree of responsibility devolving on the traveler. The treatment of climate and other physical conditions is interesting and instructive. Most of the author's remarks on health seem sane and wise: light eating, abundance of fruit, boiled or filtered water, plenty of sleep, regular hours; but when he adds "stimulants probably do more good than harm," one is inclined to doubt, in view of the large amount of testimony against spirituous liquors in tropical countries. G. D. HUBBARD.

Nigeria: Its Peoples and its Problems. By E. D. Morel. xviii and 266 pp. Maps, ills., index. Smith, Elder & Co., London, 1911. 10s. 6d. 9½ x 6.

This is one of the great works upon that region of tropical Africa which has come into English hands, great because the author is sympathetic with the human element of the problems there working out, great because he is equipped through long experience to recognize the true terms of the problems. In support of his conviction that there is a future of social development for the African among his own people and in his own home he is singularly fortunate in that Nigeria has afforded a few conspicuous examples of what the African can make of himself in the acquisition of European culture and in the employment thereof for the betterment of his own kind; Blyden is such an one, his life gainsays all the cheap sneer that the African, under the curse of Ham, must always be servile. One point which Morel makes is of peculiar interest. The tangle of languages is great. In the Bauchi province, one of quite small extent, no less than sixty-five distinct languages are in daily use. The English administrators seldom acquire any of these languages, but are forcing upon their territory a new language, semi-jargon in type, that of the Hausa, which has come into use as a trade, and above all as a military, speech. Even the Hausa takes some time to acquire, and for climatic reasons the tour of duty of each official is very brief, therefore, the Krooboy jargon of the Oil Coast is becoming standard for general employment. All this entails a degradation of such indigenous culture as has already developed and works automatically to check the normal evolution which should follow under improved social conditions and which should lead to an African advance. WILLIAM CHURCHILL.

ASIA

On and Off Duty in Annam. By Gabrielle M. Vassal. xi and 283 pp. Map, ills., index. D. Appleton & Co., New York, 1910. 9 x 6½.

Ephemeral though works of this type must be in their very essence, sure to be displaced by later and more complete narratives, we cannot have too many of them. Never yet has there been a survey so complete and so detailed as to erase the value of the preliminary reconnaissance, the accuracy of the noting of fact without connotation and the enthusiasm of the observation of that which is new and newly found. This work is very personal, it is the opening of a new world to Mrs. Vassal, and because it is a new world to the most of us we are all the better pleased to find that the recorder is just such an observer as any of us should be. She starts with the most important thing about her observation of Annam, "a few weeks after our marriage we got marching orders for Annam." In the brief table of the scientific results of what, with the utmost naiveté, she calls "making collections" we encounter *Cissa gabriellae, Lepus vassali,* and *Presbytis margarita,* which may perhaps be an expansion of a middle name hidden beneath an initial. Experience shows that these new species will probably overload the synonymy, but at any rate the friends at home were mindful of her and that is something to bear in mind when one is far away. We welcome Mrs. Vassal in Annam, we welcome her experiences, because she was very observant and set down all the strange things which came her way with no more involved feeling than that because they were of huge interest to her they would be interesting to others. In this new space and the life which fills it she has had no more involved purpose than to make collections. There results a storehouse of information, ethnology of a sort, civic studies of another sort, geography. None of this material will lose its value; observation at first hand is worthy of preservation since it must serve as the best basis for the later and more valuable comparative study.

Her best contribution to geography—for the littoral of Annam is quite well covered in French governmental administrative reports—is the narrative of her excursion to the hills of the less well known interior, somewhat more than a third of the volume. The distance amounts to no more than 200 kilometres, yet from the first night's halting place the country has practically never been recorded. At Daban on the high plateau we learn that a beginning has been made toward the establishment of an agricultural station and that the future of this French possession must rest upon the clear air and wholesome surroundings of these higher lands where Europeans may escape the enervation of the steaming swamps of the coast line. In the hills she records the life of the Mois, a race which seems to be a remnant of that little known people whose scattered remains appear as enclaves in the overlying civilization of the Peninsula all the way from Burma to China. WILLIAM CHURCHILL.

A Year with the Gaekwar of Baroda. By Edward St. Clair Weeden. 324 pp. Ills., index. Dana Estes & Co., Boston, 1912. $3.50. 9 x 6.

Baroda is one of the native states of India whose ruler bears the title of Gaekwar. This visitor to the princely house is an English clergyman and intimate friend of the Indian ruler. The book was compiled from the weekly letters which the author sent to his mother. It gives an account of the magnificent home and the manner of life of one of India's wealthiest and most enlightened princes. It is not often that the daily activities of a foreign princely family are so fully brought into view as in this book. It is all the more interesting because of the broad views and the sympathetic interest of the Gaekwar of Baroda in the uplift of the masses of the Indian people. The Gaekwar and his wife have met many of the English and American people in their visits to England and the United States. ROBERT M. BROWN.

A Manual of the Kāshmiri Language, comprising Grammar, Phrase-Book and Vocabularies. By George A. Grierson. Vol. 1: Grammar and Phrase-Book. 159 pp. Index. Vol. 2: Kāshmīrī-English Vocabulary. 211 pp. Clarendon Press, Oxford, 1911. $4 for 2 vols. 6½ x 4½ each.

Undoubtedly, practical convenience is subserved for those who will make the most use of this convenient manual of the Kāshmīrī by the assumption on the author's part of their familiarity with Híndōstānī. At the same time it detracts from the value of this treatise for philologists who would prefer to study this language without reference to a speech which at best is but a jargon. Mr. Grierson has certainly made good his claim to a simplification of the formal grammar of this language. Many of the difficulties which inhered in the older work of Wade he has cleared away. With respect, however, it appears that he has not approached the grammar from the right direction. As a newer philology comes within our reach it must be acknowledged that it will be necessary to revise the attitude of the investigator toward syntax. At present it is almost uniformly the case that grammars of the newly discovered tongues are written in terms of the grammar of the more highly developed languages of inflection. Speech of the classes more primitive than the inflected languages has its own method of making itself comprehended, and that method should be set forth in grammar simply and without prejudice arising out of the recorder's familiarity with principles and methods which belong properly to a more advanced stage of development. Assuming, however, an acquaintance with the jargon of northern Indian it is quite clear that this manual will facilitate acquaintance in Kashmir with the two dialects there in use.

WILLIAM CHURCHILL.

EUROPE

The Port of Hamburg. By Edwin J. Clapp. xiii and 220 pp. Map, ills., index. Yale University Press, New Haven, 1911. $1.50. 8½ x 5½.

"An investigation, not a program nor a prophesy" is the author's characterization of this readable, timely book. The growth of modern industrial Germany created a demand for a modern seaport, a demand which Hamburg, because of its geographical advantages and the enterprise of its citizens, has been able to satisfy and is, in consequence, the second port of Europe. The main advantage of Hamburg are its position near the North Sea on a drowned river and on the navigable Elbe, which extends the city's commercial sphere into Saxony and Austria. This latter factor, in the author's opinion, has placed Hamburg far in advance of its German competitors.

When the monopoly of the Hansa towns was broken by England and Holland, Hamburg became and continued to be a transshipment harbor and entrepôt; the city was a middleman between West Europe and Russia, Scandinavia and North Germany, a condition in operation as late as 1860, when 60 per cent. of Hamburg's trade was from England, from whence it was transshipped to the ports on the Baltic.

When Hamburg joined the German Empire it was stipulated that a portion of the port should remain free and not subject to the customs duties of the Empire. This has been a favorable factor, for it permits quick loading, unloading and reshipping of goods. Like most North German ports, Hamburg was located inland at the junction of river and ocean navigation. For modern commerce, connection with the ocean has been accomplished at a cost, in fifty-six years, of $12,000,000, by dredging a channel seaward to accommodate the largest ships at high tide and ordinary ships at low tide. The Elbe is so narrow that harbors have been excavated on either side until in 1909 there were 1,575 acres of harbor surface and a total water front of forty-one miles. Around these are quays, railroad tracks and modern facilities for handling freight.

The Elbe, extending its navigable course into Bohemia, constitutes "an extension of the lighterage service of Hamburg." Not only is the river kept navigable, but the principal towns have built harbors and efficient devices for handling freight. Moreover, the Elbe is connected by canals with the rivers of eastern Germany. The Prussian railroads do not cooperate favorably with the Elbe traffic, but the railroads of Saxony and Austria follow the opposite policy, so that the Austrian exports at Hamburg exceed those at Trieste. By favorable rates much export freight is attracted to Hamburg from the west German industrial region, freight that would otherwise pass down the Rhine. The interesting story of the Hamburg-American Line, its rise, development and connection with the home port is told in considerable detail.

The eight chapters treat of (1) the development of the hinterland; (2) the channel to the sea; (3) port facilities; (4) oversea lines; (5) shipbuilders and merchants; (6) waterways and railways; (7) shipping and commerce in 1907; (8) Hamburg's commerce with its hinterland, 1907. Maps and illustrations that illustrate add to the value of the book.

The book is timely and suggestive when so much is being said about the development of American waterways. The readable style and abundance of well chosen facts make it welcome to the teacher of geography, either in secondary school or college. F. V. Emerson.

PHYSICAL GEOGRAPHY

Charts of the Atmosphere for Aeronauts and Aviators. By A. Lawrence Rotch and Andrew H. Palmer. 1st edition. 96 pp. of text. John Wiley & Sons, New York, 1911. $2. 9 x 11½.

It was one of the striking characteristics of the meteorological work which was so effectively done by the late Professor A. Lawrence Rotch that emphasis was always laid upon the practical application of the results. Thus, immediately after the founding of the Blue Hill Observatory, in 1885, the issue of local weather forecasts was begun. The splendid series of observations of cloud heights, velocities, directions of movement and methods of formation led to important conclusions regarding the use of clouds as weather prognostics; and the pioneer investigations which were carried on at Blue Hill, and elsewhere, by means of kites and balloons, naturally led Professor Rotch to emphasize the practical application of the results for the use of airmen. Thus, in the valuable set of "Charts of the Atmosphere for Aeronauts and Aviators," published about a year before his untimely death, Professor Rotch, with the collaboration of Mr. A. H. Palmer, of the Blue Hill staff, published, in simple and useful form, with clear, concise descriptive text, the results of the exploration of the free air carried on by Blue Hill Observatory, and on the Atlantic Ocean, the latter in cooperation with M. Teisserenc de Bort. These charts, which are the first of their kind, furnish a valuable and interesting summary of the splendid work done by Professor Rotch, which will always stand as one of the most important American contributions to meteorology.

Most of the twenty-four charts are concerned with wind velocities and wind pressures at different altitudes at Blue Hill. The first and the last charts will, however, doubtless have the most general "popular" interest. The former gives a vertical cross-section of the atmosphere up to a height of seven miles, and shows the greatest heights to which man has climbed or ascended in the free air; the average height of the different kinds of clouds measured at Blue Hill; the atmospheric densities at different altitudes, and the average heights in the free air at different latitudes of the temperatures of freezing, 0° Fahr., and 30° below zero. The last chart of the set shows the best aerial routes to be followed by aviators across the North Atlantic Ocean in summer.

No one can study these excellent charts without feeling very deeply the loss which meteorology has sustained in the recent death of Professor Rotch. He truly was a pioneer in a new science. R. DeC. Ward.

Our Weather. By J. S. Fowler and William Marriott. xi and 131 pp. Maps, ills., index. E. P. Dutton & Co., New York, 1912. 35 cents. 6 x 4.

This is one of the best of the numerous small texts on meteorology which we have seen. It gives, within the compass of 131 pages, a clear, readable and accurate account of the more common meteorological phenomena and observations, with sufficient explanation for the beginner. There are only two or three things which we wish were differently stated. The deflection of the wind from the gradient is still explained in the incomplete way first suggested by Hadley. And, "when rain is frozen, hail is formed," is somewhat inaccurate, even for a very simple primer. On the whole, however, we are much pleased with the little book. It is well illustrated, pleasantly written, and covers the subject in a remarkably successful way. The authors have skilfully avoided going too far into details, and have had space enough to include mention of some human relations of the weather, weather and agriculture, and weather lore. It is worth while to note that of the ten cases at Greenwich since 1841 when the temperature has exceeded 94°, three occurred during the memorable summer of 1911 (p. 30). R. DeC. Ward.

ECONOMIC GEOGRAPHY

Les Chemins de Fer Coloniaux Français. Par R. Godfernaux. 439 pp. Maps, ills. H. Dunod & E. Pinat, Paris, 1911. 12½ x 9.

This is a handy reference work on railroads built in the French colonies. The author deals mainly with technical methods in vogue among French engineers practicing outside the boundaries of their country. The information given on the resources of the different colonies is of a very general nature and devoid of the interest which will be found in the short accounts of their economic development.

A historical sketch of the exigencies that have led to the building of the several lines precedes their study. This is followed by an account of the construction replete with tales of financial and technical difficulties. All these notes contain data of value to engineers desirous of acquiring information regarding technical practice in districts situated at remote distances from centers of civilization. Great thoroughness appears to have prevailed in the collection of figures on costs and revenues of operation. Equal care has been bestowed on the technical description of the line and the rolling stock in use. While this is not of immediate import to the geographer, the description of the districts lying on either side of the various right-of-ways are not lacking in geographical interest when coupled to a study of these same districts as affected by the lines constructed.

Some forty railroad maps scattered through the text serve to illustrate the gradual penetration of the network of steel tracks in the heart of regions but recently considered as inaccessible. Unfortunately, no scale is given on some of these maps, the incentive to consult them being thereby weakened. Barring this error of omission, their usefulness as regards the location of these oversea French railroads is not questionable. Leon Dominian.

The Railway Conquest of the World. By Frederick A. Talbot. xv and 334 pp. Ills., index. J. B. Lippincott Co., Philadelphia, 1911. $1.50. 8½ x 5½.

No better measure of the physiographic aspects of the earth can be found than in the efforts of mankind to subdue them; and the railroads which have penetrated nearly every type of earth structure and climatic condition are monuments not only of the ingenuity of mankind but also of the wonders of the physical world. In this book there may be found a vast store of information written largely from the engineer's standpoint, but of necessity portraying the varying physical features which advancing civilization is striving to subdue. Each chapter deals with a single enterprise, as "Across Siberia by Rail"; and each is extensively illustrated. The pictures are remarkable and form an invaluable feature. The history of tunnel construction centers around the boring of the Gotthard. Among other topics are the narrow-gauge railroad, an effort to reduce the cost of construction, which reaches its climax in the Otavi line in German South-West Africa; Meigg's masterpiece, the Oroya road; the penetration of Alaska; Rhodes's dream of a Cape to Cairo connection; the difficulties of the desert in building the Pilgrim Road to Mecca; the conquest of heavy rainfall in building the railroad around the lower Congo rapids; Flagler's railroad over the sea to Key West; and the first continental railroad across South America from Buenos Aires to Valparaiso. The romance connected with the construction of these great pathways of commerce is told in a popular vein. ROBERT M. BROWN.

TEXT BOOKS

The Student's Handbook of Stratigraphical Geology. By A. J. Jukes-Browne. 2nd edition. xiv and 668 pp. Maps, ills., index. Edward Stanford, London, 1912. 12s. 8 x 5½.

The new edition of this well known textbook contains numerous amplifications. The work is restricted to the geology of Europe. The British Isles have been treated with the full degree of comprehensiveness required by the stage of learning of the students for whose use the book is intended. This has not prevented the author from considering stratigraphic succession as a unit in which the strata missing in Great Britain are studied with as much detail as those represented. Thus considered, European stratigraphy is particularly well described. The physical and geographic conditions related to the formation of each of the great series of strata are discussed briefly. They have been restored cartographically in the case of the Lower Devonian, the Upper Trias and the Lower Cretaceous. This constitutes a happy innovation in English textbooks and one which, it is hoped, may be maintained. The new edition also contains more illustrations and maps than the previous one. LEON DOMINIAN.

GENERAL

The Century Atlas of the World. Prepared under the superintendence of Benjamin E. Smith, A.M., L.H.D. 45 historical and 294 geographical maps (including 168 insets) on 139 plates; index. Vol. XII of the Century Dictionary and Cyclopedia. Revised and enlarged edition, 1911. The Century Co., New York. Not sold separately. 12 x 9.

The chief value of the Century Atlas to the geographer lies in its large-scale maps of the individual states of the United States and of the provinces of Canada. In the inclusion of such maps it is not unlike other general reference atlases published and printed in the United States; it is in the more careful compilation, however, and in the superior mechanical reproduction of its maps that the Century Atlas stands out among current American atlases. Especially in this latter respect it holds a special place in American cartography; however unsuited to the highest quality of map-making the wax engraving process may be, one may well concur with Zondervan (Allgemeine Kartenkunde, 1901, note p. 157) in the opinion that the Century Atlas represents the highest type of work that this process is capable of. The credit for this work is due the Matthews-Northrup Works of Buffalo.

The states of the United States are represented on 52 plates. With a few exceptions each state is at least shown on a separate plate; in the case of the more important states, however, two or more plates are devoted to one state. The average scales employed for the various sections of the country are: New

England, 9-13 miles to the inch; Middle Atlantic States, 16 miles; Middle Western and Southern States, 22-27 miles; Rocky Mountain states, 40-50 miles; states of the Pacific Slope, 25-32 miles. Ontario, Quebec and the Maritime Provinces are shown on scales varying from 27 to 34 miles to the inch.

To these maps of the United States and Canada have been added in the new edition two instructive maps on the scale of 37 miles to the inch showing the electric railways (trolleys) of New England, the Middle Atlantic and the Central States. Large-scale maps of Alaska, Cuba, Haiti, Porto Rico, the Philippines and Hawaii respond to our special interest in these regions.

The maps of non-American territory, while very fair, have nothing special either in scale or content to commend themselves to users of such standard atlases as the Andree, Stieler, or Vivien de St. Martin. They are all characterized, however, by careful compilation and neat appearance.

Throughout the atlas this neat appearance is especially enhanced by the use of marginal instead of areal colors alone to denote political divisions and by a felicitous selection of harmonizing colors. Legibility is assured by the use of olive for relief and red for railroads. Relief is shown by contours and hachures on the maps of the United States, Canada and Mexico, and by hachures alone on the others. Other valuable features of the atlas are the delineation of steamship routes on the larger scale maps, the use of isobaths, and the representation of explorers' routes on the general maps. Mention should also be made of the extremely convenient size of the atlas which allows of easy reference.

A short section devoted to historical maps and an index containing 180,000 names complete the atlas.

The Century Atlas, which has been constantly revised since its inception in 1897, especially in 1899 and 1901, may therefore in its present edition be considered as representing a material advance towards the realization of that desideratum, an American atlas for general reference which satisfies the requirements both of scientific and of technical standards. W. L. G. J.

Mathematische Geographie. Von Prof. Dr. Hermann J. Klein. Dritte verbesserte Auflage. 261 pp. Diagrams, index. J. J. Weber, Leipzig, 1911. Mk. 2.50. 7½ x 4½.

A useful little handbook. The bits of history of science are the most interesting parts of a work neither better nor worse in form of presentation than most books of its kind. Its readers will probably be in quest of knowledge, willing to work and not too expectant of amenities of style. But why call it *geography?* My name for it would be terrestrial astronomy or terrestrial mathematics. Not strange that it should have this character, as Dr. Klein is an astronomer. Form and motion of the earth, gravity, precession, nutation, globes and maps are his topics. Why include *precession* and *nutation* in mathematical geography? Why omit the customary tides?

There is a very general tendency nowadays to make biological reactions essential to geography, to insist that the earth, as it were, *account for its inhabitants.* The form of the earth affects them, so do its weight and motions, but the bearing of precession and nutation on plant or animal must be rather remote. The treatment here is frankly astronomical, which may fairly be objected to as long as geography is in the title.

What is the proper subject of mathematical geography? Map-making, gravity, day and night (rather than *rotation*), seasons (rather than revolution of the earth); anything geographical under some one of the modern conceptions is mathematical geography when mathematically treated. *Geographical,* however, should not be regarded as equivalent to *terrestrial.* MARK JEFFERSON.

The Association of History and Geography. By A. J. Berry. 171 pp. Blackie & Sons, Ltd., London, 1911. 1s. 6d. 7 x 5.

History has the first place in the title of this interesting little volume as well as in the author's mind. Its geography is of the type now passing away. There can be no doubt of Mr. Berry's intimacy with much history, while nothing in the book compels us to suppose he has any knowledge of modern physiography whatever. The use he makes of even the older geography is at times astonishing. On p. 52, speaking of the Romans and the gaps by which they passed the Alps, he says: "The St. Bernard Pass, which is of present commercial importance as leading to the Rhine, was not used by the Romans. They travelled by the Julier Pass to meet the Valley of the Inn, which enabled them to arrive at the headwaters of the Rhine." The student who looks up the two passes on his map will surely be puzzled.

The strong point of the book is a wealth of illustrations of the history that lies behind familiar geographic place-names and even buildings. Particularly for England and London is this true. There are many interesting bits on the history of discovery and exploration, and lines of march and migration. Doubtless, this was the author's main object. The account of the Holy Land appeals to the geographer more than anything else in the book. For its length, it is excellent.

The author suggests that geography might tell not only *where?* but *why there?* Perhaps he is not aware how much further he might have gone in that direction. Compare his historic account of Rome with the physiographic one of W. M. Davis in *The Journal of Geography,* 1911, p. 197, and with J. G. Kohl's geographic treatment in *Die Haupstaedte Europas,* Leipzig, 1864, p. 39, or, better still, his account of London, with its admirable elucidation of place-names, and that of Kohl, analyzing the advantages of the site. Thus it happens that an excellent little book leaves a geographer discontented. MARK JEFFERSON.

The Outlines of Military Geography. By Col. A. C. McDonnell. Vol 1: xiii and 227 pp. Index. Vol. 2: Maps. Hugh Rees, Ltd., London, 1911. 12s. 6d. 8½ x 6.

If serious war comes upon Great Britain it is to be hoped she will turn rather to her University men than to Col. MacDonnell for advice in geographical matters. His geography is old-timish and superficial. There are many interesting items in his book, especially the account of the Northwest boundary of India, with the excellent map of Persia and Afghanistan. It is a pity that this map fails to show 7 per cent. of the places referred to there and that another 16 per cent. are spelled one way in the map and another in the text. It is, however, too much a list of disconnected items. There appears to be no understanding of the earth's relief. Thus at p. 24 he writes of the roads between the French Alps and Mantua, without mention of the Po Valley as a unit lowland between mountains: "It is a remarkable thing, but the roads here along this line are compressed into a narrow kind of neck between Milan and Piacenza only 40 miles wide." The maps fail to show many of the places referred to, the worst being that of France. The proofreading of geographical names is singular:—Bohemia forest, Riesingebirge (twice), Maine, once for Marne and often for Main, river Hudson, Shimla, Kustenjo and Jada Bay. In no sense a strong book. MARK JEFFERSON.

Monograph of the Okapi. By Sir E. Ray Lankester Atlas of 48 plates compiled with the assistance of W. G. Ridewood. viii pp. British Museum, London, 1910. 25s. 12½ x 9½.

We learn with extreme regret that "it is doubtful whether the atlas will be followed by a volume of text at a late date." To be sure the monograph by Fraipont is such as abundantly to cover the subject, and the literature has already become considerable. But those who recall the zeal with which Sir Ray Lankester threw himself into the study of this rare animal when its existence was first made known, who remember how the acquisition of new specimens seemed to force into consideration a new adjustment of the value of variation in individuals as critical of class variety, will feel a sense of loss in that this distinguished authority has not expressed himself in text as completely as he has done in picture. These plates offer a very full record of the important features of okapi osteology. They are singularly rich in illustration of the characteristic stripes of the legs. WILLIAM CHURCHILL.

OTHER BOOKS RECEIVED

NORTH AMERICA

ARKANSAS STATE SUPPLEMENT. By Rose Bland. Tarr & McMurry's New Geographies. 32 pp. Maps, ills. Macmillan Co., New York, 1912. 25 cents. 9½ x 7½. [An elementary geographic study of the State of Arkansas. The text lacks a good map.]

THE SCOT IN AMERICA AND THE ULSTER SCOT. Being the substance of addresses before the Edinburgh Philosophical Institution, 1st November, 1911, and the Presbyterian Historical Society, Belfast, 26th March, 1912. By Whitelaw Reid. 67 pp. Macmillan Co., New York, 1912. 40 cents. 8 x 5½. [A review of the doings of some Scotch pioneers in America.]

AFRICA

GOMERA, DIE WALDINSEL DER KANAREN. Reisetagebuch eines Zoologen. Von Walther May. ix and 214 pp. Maps, ills. Reprint, *Verhandl. des Naturwiss. Vereins in Karlsruhe.* Vol. 24. G. Braunsche, Karlsruhe, 1912. Mk. 3. 10 x 6½. [The general geography of this ill-known island is ably described on the basis of a season's work. Contains zoological, botanical, geological and ethnographical notes.]

THE MAN-EATERS OF TSAVO AND OTHER EAST AFRICAN ADVENTURES. By Lieut.-Col. J. H. Patterson, with a foreword by Frederick Courteney Selous. xx and 351 pp. Ills. Macmillan Co., New York, 1912. 50 cents. 7 x 5. [A new and cheaper edition of this well-known book. Thrilling experiences of African hunting and the story of the man-eating lions' attack upon the laborers of the Uganda R.R.]

DIE UNTERE KREIDE VON DEUTSCH-OSTAFRIKA. Dissertation. Von Dr. Erich Krenkel. 50 pp. Ills. Königl. Bayer. Ludwigs-Maximilians-Universität zu München, 1911. 13 x 10. [The faunal characteristics of the Lower Cretaceous in German East Africa are described in detail.]

ASIA

LA CITÉ ANNAMITE. Tome Second. Les Sédentaires. Par Camille Briffaut. xii and 133 pp. Librairie de la Soc. du Recueil Sirey, Paris, 1912. Frs. 4. 9 x 5½. [An excellent description of the Sino-Annamitic type with an account of his social progress.]

THE ENGLISH FACTORIES IN INDIA. 1637-1641. A Calendar of Documents in the India Office, British Museum, and Public Record Office. By William Foster. xlvi and 339 pp. Index, ills. Clarendon Press, Oxford, 1912. 12s. 6d. 9 x 6½. [A new instalment of detailed insight in the early commercial activities of the English in India.]

KINA OCH JAPAN. Studier af August Strindberg. 86 pp. Björck & Börjesson, Stockholm, 1911. 9 x 6. [A contribution to the comparative study of the Chinese and Japanese languages.]

PALESTINE AND SYRIA, with routes through Mesopotamia and Babylonia and the Island of Cyprus. Handbook for Travellers. By Karl Baedeker. civ and 461 pp. 21 maps, 56 plans, panorama of Jerusalem, index. 5th edition, remodelled and augmented. Karl Baedeker, Leipzig, 1912. 6½ x 4½. [A large selection of useful information. Maps well drawn and informatory. Usual standard of excellence maintained.]

THE SOUL OF THE FAR EAST. By Percival Lowell. x and 226 pp. Ills. Macmillan & Co., New York, 1911. $1.60. 8 x 5½. [A reprint.]

DIE REISE DES ARABERS IBN BATŪTA DURCH INDIEN UND CHINA. (14. Jahrhundert). Bearbeitet von Dr. Hans von Mžik. In series, Bibliothek denkwürdiger Reisen. 490 pp. Maps, index. Gutenberg-Verlag, Berlin, 1911. Mk. 9. 9 x 6. [The travels of Ibn Batūta are considered as a phase of the commercial intercourse between Arabia and the Far East.]

AUSTRALASIA

Neuseeland nach seiner Geschichte und seiner Natur, sowie der materiellen und intellektuellen Entwicklung. Dissertation. Von M. F. Blassneck. viii and 138 pp. Map. Bonn, 1908. [A condensed monograph on the island.]

Statistics of the State of Queensland for the year 1910. (In ten parts and index.) Compiled from official records in the government statistician's office. By Thornhill Weedon. Government Statistician, Brisbane, 1911. 12s. 6d. 13 x 8½. [The statistics relate to population, commerce, finance, law and crime, government and production, etc.]

Die Wirtschaftsorganisation der Maori auf Neuseeland. Von Waclaw von Brun. In series, Beiträge zur Kultur-und Universalgeschichte. 18. Heft. x and 119 pp. R. Voigtländer, Leipzig, 1912. Mk. 4. 9 x 6. [A study of social conditions among the Maori.]

EUROPE

Die Alpen. Von Hermann Reishauer. In series: Aus Natur und Geisteswelt, Vol. 276. 140 pp. Maps, ills., index. B. G. Teubner, Leipzig, 1909. Mk. 1.25. 7 x 5. [An elementary regional description of these mountains.]

Les Alpes de Provence. Guide du Touriste, du Naturaliste et de l'Archéologue. Par Gustave Tardieu. vi and 303 pp. Map, ills., index. Masson et Cie, Paris, 1912. Frs. 4.50. 7 x 4½. [A suggestive handbook for the observer visiting this region. The picturesque aspect of the land, its natural history and archæology are briefly described.]

Beautiful Britain. (a) Isle of Man. By Joseph E. Morris. 63 pp. (b) North Wales. By Joseph E. Morris. 64 pp. (c) The Isle of Wight. By G. E. Mitton. 64 pp. Index and ills. in each. Macmillan Co., New York, 1911. 75 cents each. 9 x 6½. [Full of interesting regional information.]

Belgium, the Land of Art. Its History, Legends, Industry and Modern Expansion. By William Elliot Griffis. xii and 310 pp. Ills., index. Houghton Mifflin Co., Boston, 1912. $1.25. 7½ x 5. [The history of Belgium, its legends, industry and modern expansion are reviewed in a general way. The book will enable one to form an adequate conception of these subjects without burdening the mind with items required by the specialist.]

Handbook to Belgium, including The Ardennes and Luxemburg. 6th edition, revised and enlarged. 240 pp. Maps, plans, ills., index. Ward Lock & Co., Ltd., London, 1912. 2s. 6d. 7 x 4. [Contains practical information for the traveler.]

Jahrbuch über die deutschen Kolonien. Herausgegeben von Dr. Karl Schneider. 5. Jahrgang. 274 pp. Maps, index. G. D. Baedeker, Essen, 1912. Mk. 5. 9 x 6. [An excellent yearly resumé of general progress in German colonies. Particular attention paid to economics.]

Palermo. Storia, Monumenti, Industria, Commercio, Arti, Istituzioni, Scienze, Dintorni. In series: Le Città d'Italia Illustrate. 92 pp. Ills. Soc. Editrice Sonzogno, Milan, 1912. L. 1.25. 11 x 8. [The description of this city includes much that is worth knowing about its past and present.]

Rom und die Campagna. Von Th. Gsell Fels. 7. Auflage. Meyers Reisebücher. xvi and 1083 pp. Maps, ills., index. Bibliographisches Institut, Leipzig, 1912. International News Co., New York, N. Y. Mks. 12.50. 7 x 5. [A detailed description of the Holy City and its environs. Many maps.]

HISTORICAL

Ancient Assyria. By C. H. W. Jones. Cambridge Manuals of Science and Literature. vii and 175 pp. Map, ills., index. G. P. Putnam's Sons, New York, 1912. 6½ x 5. [An elementary sketch of Assyrian history.]

GENERAL

The Railway Library. 1910. (Second Series.) A Collection of Noteworthy Addresses and Papers mostly Delivered or Published During the Year Named. Compiled and Edited by Slason Thompson. 456 pp. Bureau of Railway News and Statistics, Railway Exchange Building, Chicago, 1911. 8½ x 6. [Various phases of the transportation problem discussed by experts. Much space devoted to the question of efficiency in railroad management.]

Spiders. By Cecil Warbuton. Cambridge Manuals of Science and Literature. x and 136 pp. Ills., index. G. P. Putnam's Sons, New York, 1912. 40 cents. 6½ x 5. [Describes the habits and modes of life of the commoner spiders.]

Die Kultur der Kulturlosen. Ein Blick in die Anfänge menschlicher Geistesbestätigung. Von Dr. Karl Weule. 99 pp. Ills. Franckh'sche Verlagshandlung, Stuttgart, 1912. Mk. 1. 8½ x 5½. [A suggestive study on the origin of human civilization by reference to present day methods of life among the least civilized races of the earth.]

The Bay Psalm Book. Being a *Facsimile* Reprint of the First Edition, printed by Stephen Daye at Cambridge, in New England in 1640. New England Society, New York, 1912. 8 x 5½. [A reprint of the first edition of the book that has the distinction of being the first printed in English America.]

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NEW MAPS

EDITED BY THE ASSISTANT EDITOR

MAPS ISSUED BY UNITED STATES GOVERNMENT BUREAUS

U. S. GEOLOGICAL SURVEY

Topographic Sheets
(Including Combined and Special Topographic Maps)

California. (a) Dry Creek Quadrangle. Surveyed in 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 121°45′0″ - 121°37′30″ W. Contour interval 5 ft. Edition of June 1912.

(b) Keefers Quad. Surveyed in 1910. 1:31,680. 39°52′30″ - 39°45′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. (preliminary) of June 1912.

(c) McKittrick Quad. Surveyed in 1907-1910. 1:125,000. 35°30′ - 35°0′ N.; 120°0′ - 119°30′ W. Interval 100 ft. Edit. of June 1912.

(d) Nelson Quad. Surveyed in 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 121°52′30″ - 121°45′0″ W. Interval 5 ft. Edit. of May 1912.

(e) Newhard Quad. Surveyed in 1904 and 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. of May 1912.

(f) Oroville Quad. Surveyed in 1910. 1:31,680. 39°37′30″ - 39°30′0″ N.; 121°37′30″ - 121°30′0″ W. Interval 5 ft. Edit. (preliminary) of May 1912.

(g) Singer Creek Quad. Surveyed in 1910. 1:31,680. 40°0′0″ - 39°52′30″ N.; 122°0′0″ - 121°52′30″ W. Interval 5 ft. Edit. (preliminary) of June 1912.

California-Nevada. Ivanpah Quad. Surveyed in 1909-1910. 1:250,000. 36°0′ - 35°0′ N.; 116°0′ - 115°0′ W. Interval 100 ft. Edit. of June 1912.

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Maine. Livermore Quad. Surveyed in 1910. 1:62,500. 44°30′ - 44°15′ N.; 70°15′ - 70°0′ W. Interval 20 ft. Edit. of May 1912.

Montana. Thibedeau Lake Quad. Surveyed in 1909. 1:125,000. 49°0′ - 48°30′ N.; 110°0′ - 109°30′ W. Interval 20 ft. Edit. of June 1912.

New York. (a) Hammond Quad. Surveyed in 1908-1910. 1:62,500. 44°30′ - 44°15′ N.; 75°45′ - 75°30′ W. Interval 20 ft. Edit. of April 1912.

(b) McKeever Quad. Surveyed in 1910. 1:62,500. 43°45′ - 43°30′ N.; 75°15′ - 75°0′ W. Interval 20 ft. Edit. of June 1912.

(c) New Berlin Quad. Surveyed in 1910. 1:62,500. 42°45′ - 42°30′ N.; 75°30′ - 75°15′ W. Interval 20 ft. Edit. of June 1912.

Ohio. (a) Laurelville Quad. Surveyed in 1910. 1:62,500. 39°30′ - 39°15′ N.; 82°45′ - 82°30′ W. Interval 20 ft. Edit. of June 1912.

(b) Muskingum County, Ohio. Surveyed in 1907-1909. 1:62,500. 40°10′0″ - 39°45′30″ N.; 82°14′0″ - 81°41′30″ W. Interval 20 ft. Edit. of May 1912. [See note under 'Kentucky.']

Pennsylvania. (a) McCalls Ferry Quad. Surveyed in 1910. 1:62,500. 40°0′ - 39°45′ N.; 76°30′ - 76°15′ W. Interval 20 ft. Edit. of June 1912.

(b) Quarryville Quad. Surveyed in 1910. 1:62,500. 40°0′ - 39°45′ N.; 76°15′ - 76°0′ W. Interval 20 ft. Edit. of June 1912.

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(b) Naugatuck Quad. Surveyed in 1910. 1:62,500. 38°0′ - 37°45′ N.; 82°30′ - 82°15′ W. Interval 50 ft. Edit. (preliminary) of June 1912.

(c) Pineville Quad. Surveyed in 1910. 1:62,500. 37°45′ - 37°30′ N.; 81°45′ - 81°30′ W. Interval 50 ft. Edit. of April 1912.

(d) Pounding Mill Quad. Surveyed in 1909-1910. 1:62,500. 37°15′-37°0′ N.; 81°45′-81°30′ W. Interval 50 ft. Edit. (preliminary) of April 1912.

(e) Welch Quad. Surveyed in 1909-1910. 1:62,500. 37°30′-37°15′ N.; 81°45′-81°30′ W. Interval 50 ft. Edit. of April 1912.

Geologic Sheets Accompanying Folios of the Geologic Atlas of the United States

Maryland. Choptank Quadrangle. Surveyed in 1905-1910. 1:125,000. 39°0′-38°30′ N.; 76°30′-76°0′ W. Areal Geology. Contour interval 10 ft. 9 colors. Edit. of Jan. 1912. Accompanies "Choptank Folio (No. 182)" by B. L. Miller, 1912.

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Pennsylvania. Burgettstown Quad. Surveyed in 1904. 1:62,500. 40°30′-40°15′ N.; 80°30′-80°15′ W. Interval 20 ft. Edit. of Aug. 1910. (a) Areal Geology. 7 colors. (b) Structure and Economic Geology. 7 colors. (c) Oil and Gas. 4 colors.

Carnegie Quad. Surveyed in 1903-1904. 1:62,500. 40°30′-40°15′ N.; 80°15′-80°0′ W. Interval 20 ft. Edit. of Dec. 1910. (a) Areal Geology. 9 colors. (b) Structure and Economic Geology. 9 colors. (c) Oil and Gas. 5 colors.

Accompany "Burgettstown-Carnegie Folio (No. 177)" by E. W. Shaw and M. J. Munn, 1911.

Pennsylvania. Foxburg Quad. Surveyed in 1905-1907. 1:62,500. 41°15′-41°0′ N.; 79°45′-79°30′ W. Interval 20 ft. Edit. of Dec. 1910. (a) Areal Geology. 10 colors. (b) Structure and Economic Geology. 12 colors. (c) Oil and Gas. 4 colors.

Clarion Quad. Surveyed in 1905 and 1906. 1:62,500. 41°15′-41°0′ N.; 79°30′-79°15′ W. Interval 20 ft. Edit. of Nov. 1910. (a) Areal Geology. 7 colors. (b) Structure and Economic Geology. 9 colors. (c) Oil and Gas. 6 colors.

Accompany "Foxburg-Clarion Folio (No. 178)" by E. W. Shaw and M. J. Munn, 1911.

Maps Accompanying Publications

Pennsylvania. (a) Geologic structure of the Foxburg, Clarion, Kittanning and Rural Valley quadrangles shown by contours on the Vanport limestone. [1:375,000]. 41°15′-40°45′ N.; 79°45′-79°15′ W. Contour interval 50 ft.

(b) Probable preglacial drainage of the northwestern part of the Foxburg quadrangle. [1:125,000]. [41°15′-41°3′ N.; 79°45′-79°35′ W.]

(c) Structure of the oil bearing sands and of the rocks at the surface of the Foxburg and Clarion quadrangles. [1:387,000]. [41°15′-41°0′ N.; 79°45′-79°15′ W.]

Accompany, as Figs. 7, 9 and 12, "Foxburg-Clarion Folio (No. 178)," 1911, *Geol. Atlas of the U. S.*

Pennsylvania. (a) Unsymmetrical drainage of Burgettstown and Carnegie quadrangles, showing long tributaries flowing southeast and short tributaries flowing northwest. [1:250,000]. [40°30′-40°15′ N.; 80°30′-80°0′ W.]

(b) Sketch map showing the probable preglacial drainage of western Pennsylvania. [1:3,000,000]. [42°40′-41°20′ N.; 81°0′-78°20′ W.]

Accompany, as Figs. 3 and 7, "Burgettstown-Carnegie Folio (No. 177)," 1911, *Geol. Atlas of the U. S.*

[Map (b) occurs also as Fig. 8 in Folio No. 178.]

NORTH AMERICA

CANADA

BRITISH COLUMBIA. Tongue of Sir Sandford Glacier (Selkirk Range), showing position of stones for determining ice flow. From a photographic survey based on triangulation. By Howard Palmer. 1911. 1:20,000. [51°41′ N. and 117°53′ W.]. Accompanies, on p. 450, "Observations on Sir Sandford Glacier, 1911" by H. Palmer, *Geogr. Journ.*, Vol. 39, No. 5, 1912, pp. 446-453.

[Cf. map listed under "Canada" (sixth entry) in *Bull.*, Vol. 43, 1911, p. 230.]

AFRICA

Egypt. [Seventeen sheets (listed from N. to S. and from left to right) of the topographic map of] Egypt. 1:50,000. 3 to 4 colors. Survey Dept. of Egypt, Cairo. All except (7) second edition, 1910-11. (1) Sheet III-IV N.E. (Tel el Kebîr). 30°36′ - 30°24′ N.; 31°45′ - 32°0′ E. (2) III-V N.E. (Nefîsha). 30°36′ - 30°24′ N.; 32°0′ - 32°15′ E. (3) III-VI N.E. (Isma'ilîa). 30°36′ - 30°24′ N.; 32°15′ - 32°30′ E. (4) II-III N.E. (Gheita). 30°24′ - 30°12′ N.; 31°30′ - 31°45′ E. (5) II-VI N.E. (Great Bitter Lake). 30°24′ - 30°12′ N.; 32°15′ - 32°30′ E. (6) II-VII N.E. (Little Bitter Lake). 30°24′ - 30°12′ N.; 32°30′ - 32°45′ E. (7) I-I N.W. (Qatta). 30°12′ - 30°0′ N.; 30°45′ - 31°0′ E. (8) I-II N.E. (Cairo East). 30°12′ - 30°0′ N.; 31°15′ - 31°30′ E. (9) I-VII N.E. (Shallūfa). 30°12′ - 30°0′ N.; 32°30′ - 32°45′ E. (10) I-I S.E. (Giza Pyramids). 30°0′ - 29°48′ N.; 31°0′ - 31°15′ E. (11) I-II S.E. (Helwan). 30°0′ - 29°48′ N.; 31°15′ - 31°30′ E. (12) I-VI S.E. (G[ebel] Etâqa). 30°0′ - 29°48′ N.; 32°15′ - 32°30′ E. (13) I-VII S.E. (Suez). 30°0′ - 29°48′ N.; 32°30′ - 32°45′ E. (14) II-I S.E. (Dahshûr). 29°48′ - 29°36′ N.; 31°0′ - 31°15′ E. (15) II-II S.E. ('Ayat). 29°48′ - 29°36′ N.; 31°15′ - 31°30′ E. (16) III-I S.E. (Reqqa). 29°36′ - 29°24′ N.; 31°0′ - 31°15′ E. (17) III-II S.E. (Saf). 29°36′ - 29°24′ N.; 31°15′ - 31°30′ E.

[Relief in brown contours, sand in brown stippling, hydrography and canals in blue, drains in green, vegetation in green. Sheets (3), (5), (6) and (9) contain portions of the Suez Canal.

The sheets of this standard topographic map of Egypt are designated by the quadrant into which they fall, the meridian of 31° E. and the parallel of 30° N. (Cairo) being used as the ordinate and abscissa, respectively, of this division, and are numbered, in latitude, northward and southward from the abscissa, and in longitude, eastward and westward from the ordinate. Cf. the index map listed under "Egypt (b)", in *Bull.* for June, p. 557. Previous sheets listed under "Egypt", *Bull.*, Vol. 43, 1911, pp. 78 and 391.]

AUSTRALASIA AND OCEANIA

Melanesia. Melanesia: To illustrate the paper by W. H. R. Rivers. 1:10,000,000. 2°30′ - 23°0′ S.; 148°30′ E. - 179°0′ W. 2 colors. With two insets: (1) Eddystone Island (Mandegusu). 1:100,000. 8°16′ S. and 156°30′ E. 2 colors. (2) San Cristoval. 1:2,500,000. 10°30′ S. and 162°0′ E. 2 colors. Accompanies "Island Names in Melanesia" by W. H. R. Rivers, *Geogr. Journ.*, Vol. 39, No. 4, 1912, pp. 458-468.

[An attempt to systematize the nomenclature of the islands of Melanesia. The native names are given of all islands having European names.]

EUROPE

Italy. (a) La malaria in Basilicata secondo dati fornati dal Dott. Pica, Medico Provinciale di Potenza. 1:500,000. 41°9′ - 39°54′ N.; 15°23′ - 16°55′ E. 4 colors.

(b) La Malaria in Calabria secondo dati raccolti dal Prof. Gosio. 1:500,000. 40°12′ - 37°51′ N.; 15°35′ - 17°20′ E. 5 colors.

Istituto Geografico de Agostini, Novara.

[Valuable maps showing (map *a*, areally, map *b*, by place-dots) the regions affected by malaria in these southern provinces of Italy.]

POLAR

Kerguelen Island. Kerguelen Island to illustrate notes by Commander Theodor Ring (Norwegian R.N.R.). 1:1,500,000. 48°30′ - 49°50′ S.; 68°25′ - 70°43′ E. Accompanies, on p. 495, "The South and West Coasts of Kerguelen Island," *Geogr. Journ.*, Vol. 39, No. 5, 1912, pp. 493-495.

[Valuable new survey of the S. and W. coasts of the island, correcting present charts.]

ATLASES*

Stufenatlas für höhere Lehranstalten. Herausgegeben von Prof. H. Fischer und Dr. M. Geistbeck. In drei Stufen. 1. Unterstufe, 30 pp. 2. Mittelstufe, 54 pp. 3. Oberstufe, 106 pp. Velhagen & Klasing, Leipzig, 1912. Mk. 2.20. 12 x 9½. [This series of text-books is well suited to lead the student gradually to a clear understanding of the purpose of geography as well as to the interpretation of scientific facts as revealed by maps. The first book supplies elementary notions of geography based on politico-regional subdivisions. In the second, attempt is made at the very start to teach fluent map-reading. The value of physiography is suggested. The insertion of special maps draws the student's attention to the geographic phase of other sciences. The third part may be considered as the final preparatory accompaniment to an advanced course in geography. Stress is placed on the necessity of familiarity with topographic structure as revealed by cartography. Sections of maps and charts published by German government bureaus are shown. The economic features of geography are emphasized. This part also contains a systematic scheme of classification for which the various maps are grouped in sets irrespective of their paginal sequence.]

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*Prepared by L. Dominian.

ATLAS CLASSIQUE. Par G. Niox et M. Fallex. Avec une partie historique par E. Darsey. Édition de 88 Feuilles. Index. Ch. Delagrave, Paris, 1911 (?) [The maps in this school atlas are particularly good as regards legibility of the text. They are preceded by a full page of illustrated notes on the various systems of geographic projections in use. The relation of content to scale is lucidly explained by a set of nine maps of the same locality drawn on a decreasing scale. The physical phase of geography has been carefully treated within the scope of the work. Elementary notions of the subdivisions of the science are also conveyed to the student's mind by a set of special maps. In conformity with the time-honored association of geography and history in France the publishers have seen fit to insert a large number of historical maps referring to some of the leading events of world history from the earliest times to the beginning of the nineteenth century.]

CITIZEN'S ATLAS OF THE WORLD. Edited by J. G. Bartholomew. 156 pp., maps, plans, index, gazetteer and geographical statistics. John Bartholomew & Co., Edinburgh, 1912. 25s. 14½ x 10. [This atlas is thoroughly up-to-date. The polar charts have been prepared in the light of the latest explorations with the exception of Amundsen's final discovery. African boundaries are laid out according to the most recent treaties. In Oceania the insular groups have been separated by maritime boundaries. Transportation, both overland and oversea, has been carefully treated both as regards existing and projected routes. The proposed tracks of the transcontinental railroads in Canada and Australia are shown. It is especially in the presentation of general information of economic importance that the atlas will be found valuable. The insertion of commercial charts of the world's larger parts and of a map entitled "Commerce" depicting the various stages of present commercial developments throughout the world constitute particularly commendable features. The execution of the several sheets is adequate In the general index, coordinates are given for each of the localities mentioned. A descriptive gazetteer of the world is appended. As a work of reference the atlas will admirably fill the needs of the average consultant.]

ATLAS HISTÓRICO DE LA REPÚBLICA ARGENTINA. Recopilado y redactado por José Juan Biedma y dibujado por Cárlos Beyer. xix and 56 pp. Angel Estrada y Cia, Buenos-Aires, 1909. 14½ x 12. [This cartographic contribution to the history of the Argentine Republic also contains similar information regarding the other South American countries whose history is interwoven with that of the former. The maps are accompanied by a brief historical commentary. Many are devoted to the representation of military events. The first three refer to the period of discovery. Plate II in particular shows the route of the four voyages undertaken by Columbus between 1492 and 1504. The gradual extension of colonization from Central America in a N-S direction is next illustrated. The growth of Spanish colonial power to the beginning of its decline in the first years of the XIXth century is admirably revealed by the extensions and recessions of Spanish territory, on the South American continent. The sanguinary period between 1800 and 1825 is recorded by a large number of battlefield sketches. The Brazilian campaign of 1826-1828 and the war against Paraguay (1865-1870) are also illustrated by means of maps. A map of special interest is that of the campaigns against the Indians from 1814 to 1861. Much pains have been taken to ensure adequate cartographic expression of the data.]

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THE CAÑON OF THE URUBAMBA*

BY

ISAIAH BOWMAN
Yale University

[Map facing p. 896.]

The plateau Indian of Peru believes that evil spirits dwell in the eternal snows of his lofty mountains. His imagination peoples the region of perpetual winter with vindictive and invisible folk who drive him with sickness and pain out of their storm-swept homes. *Siroche*, or mountain sickness, is due to their influence, likewise the vague depression and uneasiness that go with it; yet in curious contrast is their belief in gardens bedecked with flowers on the summits of some of the highest mountains.

On the way to the great cañon of the Urubamba I traveled for several hours in company with a friendly itinerant priest and his Indian attendant. On the farther side of the desert plateau across which we rode rose the snowy crests of the eastern Cordillera of the Andes. At its foot ran a wonderful mile-deep granite cañon, within whose profound depths was the swift Urubamba. The lower course of the river is bordered by tropical forests, a number of sugar plantations, and, still farther down, by the vast territory of the rubber hunters. Through the priest I asked the Indian why he did not live in the warm and pleasant lower portions of the valley at our feet where there were many kinds of food, beautiful flowers, and perpetual spring. At first he gave the usual answer, "Because the savages live there," though his dirty and ragged clothes and his abject face gave me an impression of savagery far deeper than I had ever received from any forest-dwelling Indian. When pressed for further reasons he at last exclaimed: "Doesn't the stranger know that fever-spirits live in the valley?"

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*Account of a trip made by the author as Geographer-Geologist of the Yale-Peruvian Expedition of 1911.

"But," I protested, "you say that there are also bad spirits in the mountains and here you live among them." "Yes," he answered, "but the cold spirits of the *siroche* live only in the small country where the snow lies and at the top of the snow my great ancestors once saw flower gardens." With fever-spirits below him in the warm valleys and siroche-spirits in the mountain snows, it is little wonder that the plateau Indian looks upon his bleak home as a paradise on earth. He knows but one more attractive place—the region at the top of the snows just under the sky, where there are

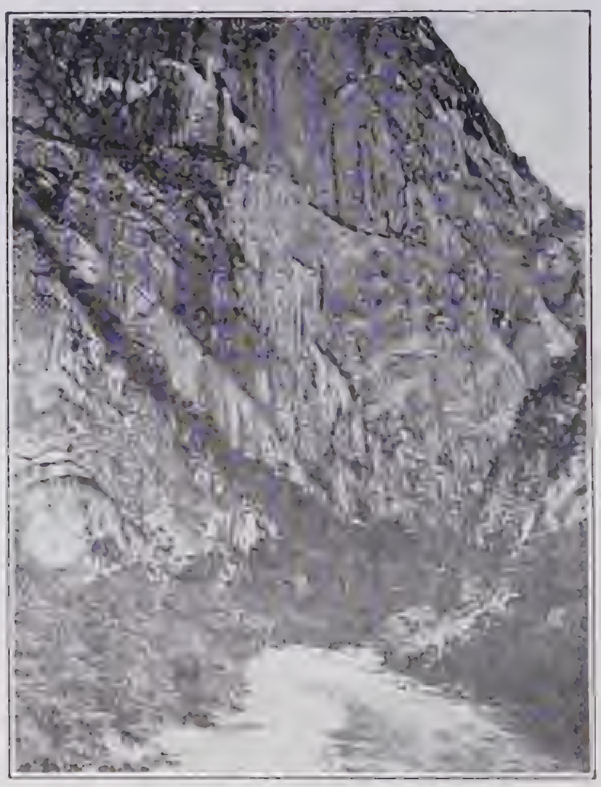

FIG. 1—The lower half of a two thousand foot cliff, granite gorge of Torontoy, Urubamba valley. At one point the wall rises nearly a mile at an inclination of 10° to 15° from the vertical and is developed entirely along joint planes. It is here that the Urubamba River crosses the granite axis of the Cordillera Vilcapampa, the easternmost system of the Andes of Peru.

flower gardens without fever-spirits, a region so high that only the mighty men of a legendary age have ever seen it.

We were about to drop over the rim of the cañon. Night had fallen, and it seemed like entering a black abyss until we came to a turn in the steep, stair-like trail where the lights of Urubamba became visible as at the bottom of an enormous bowl. Several hours of half-sliding, half-walking down the steep incline and we were in the softer airs of the valley floor. Daylight brought with it an exquisite view. The cold plateau was not even visible, but in the clear morning air the great snow-capped mountains above us seemed to be almost within hand's reach. Light, filmy clouds rode high above them; at their bases were hundreds of torrential brooks fed by the lofty snows. The long alluvial slopes of the valley, intensively culti-

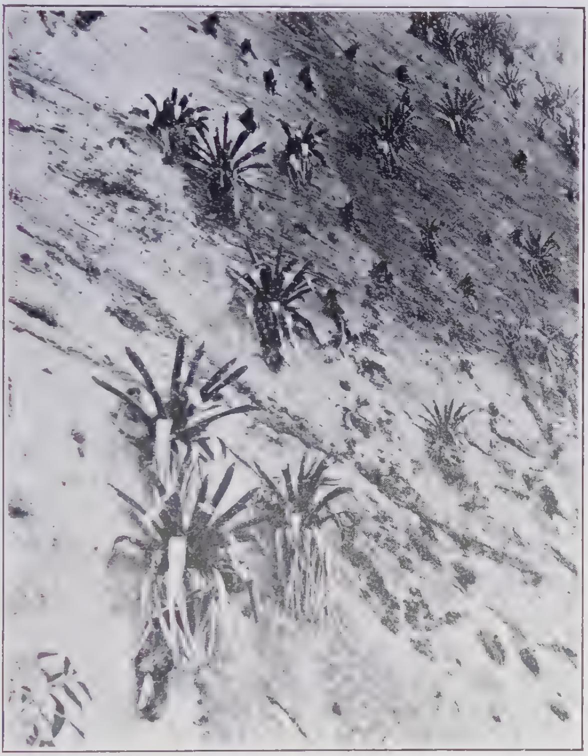

FIG. 2—Cliff vegetation near the bridge of San Miguel, lower end of the granite cañon of Torontoy. The distribution of the vegetation is controlled by the joint cracks where soil and water accumulate. Camera pointed upward 20° from horizontal.

vated, presented rare beauties after the bleak plateau. Bright green alfalfa meadows alternated with fields of ripe barley and wheat. Irrigation ditches lined with trees and shrubs criss-crossed the plain. The villagers exhibited a happier and more prosperous air. Though the temperature had fallen almost to the freezing point during the night, a few hours of sunshine sufficed to warm the air and start the soft up-valley winds. The delights of valley travel had begun.

Our chief object on the valley trip was to study the great cañon of the Urubamba below Rosalina, and to make a topographic and geologic map of it. We wished to know what secrets might here be gathered, what people dwelt along its banks, and if the vague tales of ruined cities at the top of unscalable cliffs had any basis in fact.

Among the unexplored regions of Peru none is more tempting to the geographer than the great region on the eastern border of the Andes, drained by this tributary of the Amazon. It is here that the powerful river, reënforced by hundreds of mountain-born tributaries, finally cuts its defiant way through the last of its great topographic barriers. More than seventy rapids interrupt its course; one of them, at the mouth of the Sirialo, is more than a half mile in extent, and long before one reaches its head he hears its roaring from beyond the forest-clad mountain spurs.

The great bend of the Urubamba in which the line of rapids occurs is one of the most curious hydrographic features in Peru. The river suddenly changes its northward course and striking south of west flows nearly fifty miles toward the axis of the mountains, where, turning almost in a complete circle, it makes a final assault upon the eastern mountain ranges. Fifty miles farther on it breaks through the long serrate chain of the eastern Andes in a splendid gateway more than a half mile deep, the famous *Pongo de Mainique*.

We could gather almost no information as to the nature of the river except from the report of Major Kerbey, an American, who, in 1897, descended the last twenty miles of the one hundred we proposed to navigate. He pronounced the journey more hazardous than Major Powell's famous descent of the Grand Cañon in 1867. He lost his canoe in a treacherous rapid, was deserted by his Indian guides, and only after a painful march through a well-nigh impassable jungle, was he finally able to escape on an abandoned raft. Less than a dozen have ventured down since Major Kerbey's trip was made. A Peruvian mining engineer descended the river a few years ago, and four Italian traders a year later floated down in rafts and canoes, losing almost all of their cargo. For nearly two months they were marooned upon a sand-bar waiting for the river to subside. At last they succeeded in reaching Mulanquiato, an Indian settlement and plantation owned by Pereira, near the entrance to the cañon. Their attempted passage of the last stretch of rapid resulted in the loss of all their rubber cargo, the work of over a year. Among the half dozen others who have made the journey (Indians and slave traders from down-river rubber posts) there is no record of a single descent without the loss of at least one canoe.

To reach the head of canoe navigation we made a two weeks' muleback journey north of Cuzco through the steep-walled granite cañon of Torontoy, and to the sugar and cacao plantations of the Urubamba at Santa Ana, where we outfitted. At Echarati, thirty miles farther on, where the heat becomes more intense and the first patches of real tropical forest begin, we were obliged to exchange our beasts for ten fresh animals accustomed to forest work and its privations. Three days later we pitched our tent on the river bank at Rosalina, the last outpost of the valley settlements. As we dropped down the steep mountain slope before striking the river flood plain, we passed two half-naked Machiganga Indians perched on the limbs of a tree beside the trail, our first sight of a tribe whose territory we had now entered. Later in the day they crossed the river in a dugout, landed on the sand-bar above us, and gathered brush for the nightly fire, around which they lay wrapped in a single shirt woven from the fiber of the wild cotton.

Rosalina is hardly more than a name on the map and a camp site on the river bank. Some distance back from the left bank of the river is a sugar plantation, whose owner lives in the cooler mountains, a day's journey away; on the right bank is a small clearing planted to sugar cane and yuca, and on the edge of it is a reed hut sheltering three inhabitants, the total population of Rosalina. The owner asked our destination, and to our reply that we would start in a few days for Pongo de Mainique he offered two serious objections. No one thought of arranging so difficult a journey in less than a month, for canoe and Indians were difficult to find, and the river trip was dangerous. Clearly, to start without the loss of precious time would require unusual exertion. Immediately we despatched one Indian messenger to the owner of the small hacienda across the river; one of our peons carried a second note to a man of great influence among the forest Indians, Padre Mendoza, who lives also in the distant mountains.

The answer of Señor Morales was his appearance in person to offer the hospitality of his home and to assist us in securing canoe and oarsmen. To our note the Padre, from his hill-top, sent a polite answer and the offer of his large canoe if we would but guarantee its return. His temporary illness prevented a visit which we had looked forward to with great interest.

The morning after our arrival I started out on foot in company with our arriero [muleteer] in search of the Machigangas, who fish and hunt along the river bank during the dry season and retire to their hill camps when the heavy rains begin. We soon left the well-beaten trail, and following a faint woodland path came to the river bank about a half day's journey below Rosalina. There we found a canoe hidden in the overhanging arch of vines, and crossing the river met an Indian family who gave us further directions. Their vague signs were but dimly understood and we soon found ourselves

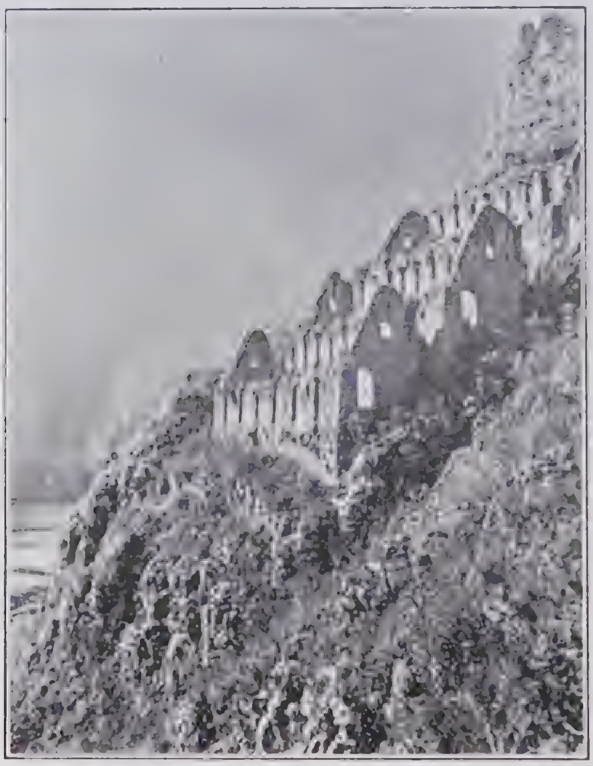

FIG. 3—Portion of the celebrated ruins of Ollantaytambo on steep mountain side east of the town. Irrigated barley fields in lower left-hand corner; temporary snow cover in upper right-hand corner.

in the midst of a carrizo [reed] swamp filled with tall bamboo and cane and crossed by a network of interlacing streams. We followed a faint path only to find ourselves climbing the adjacent mountain slopes away from our destination. Once again in the swamp we had literally to cut our way through the thick cane, wade the numberless brooks, and follow wild animal trails, until, late in the day, famished and thirsty, we came upon a little clearing on a sand-bar, the hut of La Sama, who knew the Machigangas and their villages.

After our long day's work we ate the fish and yuca, and drank the limewater prepared for us with a never-to-be-forgotten relish. Late at night La Sama returned from a trip to the Indian villages down river. He brought with him a half dozen Machiganga Indians, boys and men, and around the camp fire that night gave us a dramatic account of his former trip down river. At one point he leaped to his feet, and, with an imaginary pole shifted the canoe in a swift rapid, turned it aside from imminent wreck and shouting at the top of his voice over the roar of the rapid finally succeeded in evading what had seemed like certain death in a whirlpool. We kept a fire going all night long for we slept upon the ground without a covering, and, strange as it may appear, the cold seemed intense, though the minimum thermometer registered 59° F. The next morning the whole party of ten sunned themselves for nearly an hour until the flies and heat once more drove them to shelter.

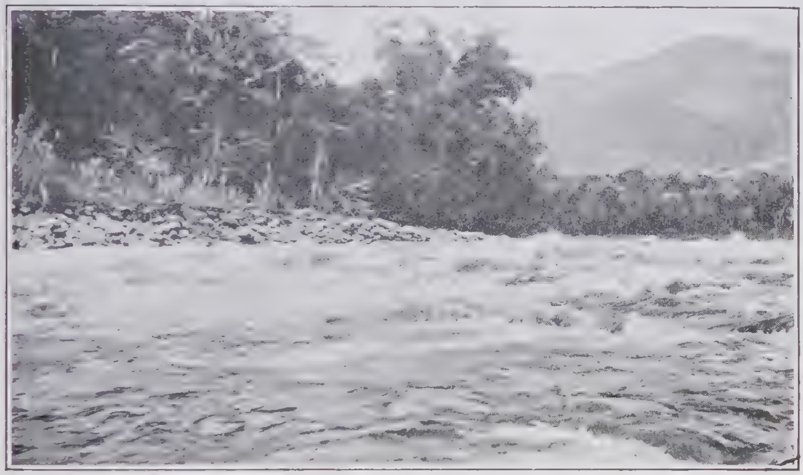

Fig. 4—The Sirialo rapids, Urubamba River, below Rosalina. These are the worst rapids between Rosalina and Pongo de Mainique. They are a half mile long and are filled with boulders brought down by the Sirialo from the distant Cordillera Vilcapampa.

Returning to camp next day along a different trail was an experience worth repeating, because of the light it threw on hidden trails known only to the Indian and his friends. Slave raiders in former years devastated the native villages and forced the Indian to conceal his special trails of refuge. At one point we traversed a cliff seventy-five feet above the river, walking on a narrow ledge no wider than one's foot. At another point the dim trail apparently disappeared, but when we had climbed hand over hand up the face of the cliff, hanging to vines and tree roots, we came upon it again. Crossing the river in the canoe we had used the day before, we shortened the return by wading the swift Chirumbia waist-deep, and by crawling along a cliff face for nearly an eighth of a mile. At the steepest point the river had so undercut the face that no passage was afforded, and we swung across some fifteen feet of broken trail on a hanging vine high above the river.

After two days' delay we left Rosalina late in the afternoon of August 7. My party included several Machiganga Indians, La Sama and Dr. W. G. Erving, surgeon of the expedition. At the first rapid we learned the methods of our Indian boatmen. It was to run the heavy boat head on into shallow water at one side of a rapid and in this way "brake" it down stream. Heavily loaded with six men, 200 pounds of baggage, a dog, and supplies of yuca and sugar cane, our canoe was as rigid as a steamer, and we dropped safely down rapid after raipd until long after dark, and by the light of a glorious tropical moon, we beached our craft in front of La Sama's hut at the edge of the cane swamp.

Here for five days we endured a most exasperating delay. La Sama had promised Indian boatmen and now said that none had yet been secured. Each day Indians were about to arrive, but by nightfall the promise was broken only to be repeated the following morning. To save our food supply—we had taken but six days' provisions—we ate yuca soup and fish and some parched corn, adding to this only a little from our limited stores. At last we could wait no longer, even if the map had to be sacrificed to the work of navigating the canoe. Our determination to leave stirred La Sama to final action. He secured a half-breed assistant and embarked with us, planning to get Indians farther down river or make the journey himself.

On August 12, at 4:30 P.M., we entered upon the second stage of the journey. As we shot down the first long rapid and rounded a wooded bend the view down river opened up and gave us our first clear notion of the region we had set out to explore. From mountain summits in the clouds long trailing spurs descend to the river bank. In general the slopes are soft-contoured and forest-clad from summit to base; only in a few places do high cliffs diversify the scenery. The river vista everywhere includes a rapid and small patches of "playa" or scraps of flood plain on the inside of the river curves. Although a true cañon hems in the river at two celebrated passes farther down, the upper part of the river flows in a somewhat open valley of moderate relief.

A light shower came up at sunset, a typical late afternoon downpour so characteristic of the tropics. We landed at a small encampment of Machigangas, built a fire against the scarred trunk of a great palm, and made up our beds in the open, covering them with our rubber ponchos. Our Indian neighbors gave us yuca and corn, but their neighborliness went no further, for when our boatmen attempted to sleep under their roofs they drove them out and fastened as securely as possible the shaky door of their hut.

All our efforts to secure Indians, both here and elsewhere, proved fruitless. One excuse after another was overcome; they plainly coveted the trinkets, knives, machetes, muskets, and ammunition that we offered them; and they appeared to be friendly enough. Only after repeated assurances of our friendship could we learn the real reason for their refusal. Some of them were escaped rubber pickers that had been captured by white raiders several years before, and a return to the rubber country meant enslavement, heavy floggings, and separation from their numerous wives. The recollection of their hardships, their final escape, the cruelty of the rubber men, and the difficult passage of the rapids below were a set of circumstances that nothing in our list of gifts could overcome. My first request a week before had so sharpened their memory that one of them related the story of his wrongs, a recital intensely dramatic to the whole circle of his listeners, including myself. Though I did not understand the details of his story, his tones and gesticulations were so effective as to hold me as well as his kinsmen of the woods spellbound for over an hour.

It is appalling to what extent this great region has been depopulated by the slave raiders and those arch enemies of the savage, smallpox and malaria. Over sixty Indians died of malaria in one year at Rosalina; and only twenty years ago seventy of them, the entire population of the Pongo, were swept away by smallpox. For a week we passed former camps near small abandoned clearings, once the home of little groups of Machigangas. Even the summer shelter huts on the sand-bars, where the Indians formerly gathered from their hill homes to fish, are now almost entirely abandoned. Though our men carefully reconnoitred each one for fear of ambush, the precaution was needless. Below the Coribeni the Urubamba is a great silent valley. It is fitted by Nature to support numerous villages, but its vast solitudes are unbroken except at night, when a few families that live in the hills slip down to the river to gather yuca and cane.

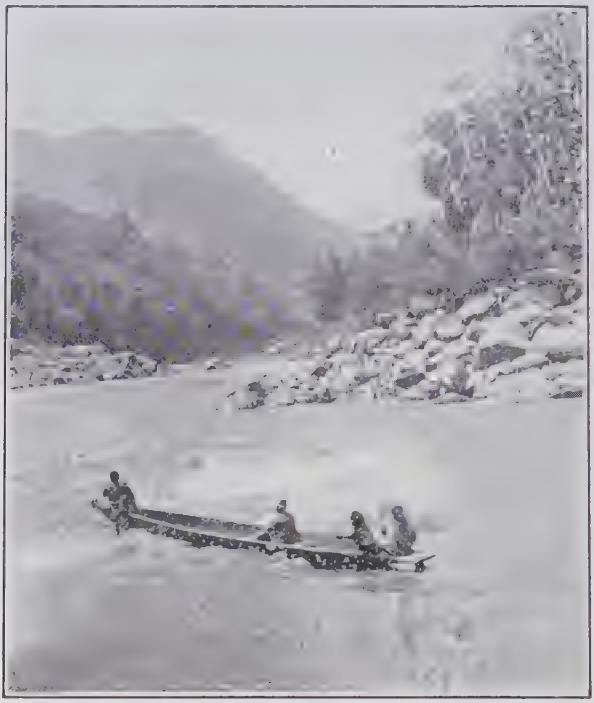

FIG. 5—Machiganga Indians taking a twenty-five foot canoe through one of the smaller rapids above the "Pongo" or gateway on the eastern border of the Andes. A speed of twenty miles an hour is attained in the swiftest rapids.

By noon of the second day's journey we reached the head of the great rapid at the mouth of the Sirialo. We had already run the great Coribeni rapid, visited the Indian huts at the junction of the big Coribeni tributary, exchanged our canoe for a larger and steadier one, and were now to negotiate one of the ugliest rapids of the upper river. The rapid is formed by the gravel masses that the Sirialo brings down from the distant Cordillera Vilcapampa. They trail along for at least a half mile, split the river into two main currents and half choke the mouth of the tributary. For nearly a mile above this great barrier the main river is ponded and almost as quiet as a lake.

We let our craft down this rapid by ropes, and in the last difficult passage were so badly handled by our almost unmanageable canoe as to suffer from several bad accidents. All of the party were injured in one way or another, while I suffered a fracture sprain that made painful work of the rest of the river trip.

At two points along the Urubamba below Rosalina the river is shut in by steep mountain slopes and vertical cliffs. Canoe-navigation below the great Sirialo and Coribeni rapids is no more hazardous than on the rapids of our northern rivers, except at the two "pongos" or narrow passages. The first occurs at the sharpest point of the abrupt curve shown on the map; the second is the celebrated Pongo de Mainique. In these narrow passages in time of high water there is no landing for long stretches. The bow paddler stands well forward and tries for depth and current; the stern paddler keeps the canoe steady in its course. When paddlers are in agreement even a heavy canoe such as ours can be generally directed into the most favorable channels. Our canoemen were always in disagreement,

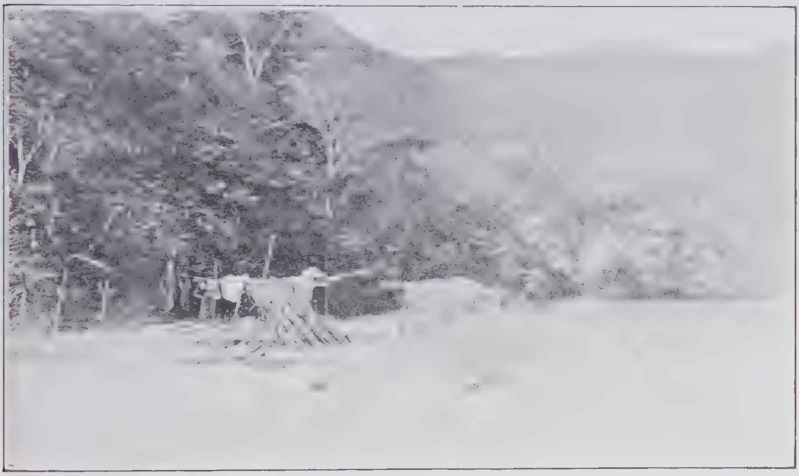

FIG. 6—A temporary shelter hut on a sand-bar near the great bend of the Urubamba (see map). The Machiganga Indians use these cane shelters during the fishing season, when the river is low.

however, and as often as not we shot down rapids at a speed of twenty miles an hour, broadside on, with an occasional bump on projecting rocks or boulders whose warning ordinary boatmen would not let go unheeded.

The scenery at the great bend is indescribably beautiful. The tropical forest crowds the river bank, great cliffs rise sheer from the water's edge, their faces overhung with a trailing drapery of vines, and in the longer river vistas one may sometimes see the distant heights of the Cordillera Vilcapampa. We shot the long succession of rapids in the first cañon without mishap, and at night pitched our tent on the edge of the river near the mouth of the Manugali.

From the sharp peak opposite our camp we saw for the first time the phenomenon of cloud-banners. A soft breeze was blowing from the western mountains and its vapor was condensed into clouds on the leeward side of the peak. The clouds were being carried down the wind and dissolved, but were constantly forming afresh at the summit. In the night a thunderstorm arose and swept with a roar through the vast forest above us. The solid canopy of the tropical forest fairly resounded with the impact of the heavy raindrops. The next morning all the brooks from the farther side of the river were in flood and the river discolored. The last mist wraiths of the storm were still trailing through the tree-tops and wrapped about the peak opposite our camp, only parting now and then, giving us most delightful glimpses of a forest-clad summit riding high above the clouds.

The alternation of deeps and shallows at this point in the river and the well-developed cañon meanders are among the most celebrated of their kind in the world. Though shut in by high cliffs and bordered by mountains the river exhibits a succession of curves so regular that one might almost imagine the country a plain from the pattern of the meanders. The succession of smooth curves for a long distance across existing mountains points to a time when a lowland plain with moderate slopes was developed here, a plain drained by strongly meandering rivers. Uplift afforded a chance for renewed down-cutting on the part of all the streams, and the incision of the meanders. The present meanders are, of course, not the identical ones that were formed on the lowland plain; they are rather their descendants. Though they still retain their strongly curved quality, and in places have almost cut through the narrow spurs between meander loops, they are not smooth like the meanders of the Mississippi. Here and there are sharp irregular turns that mar the symmetry of the larger curves. The alternating bands of hard and soft rock have had a large part in making the course more irregular. The meanders have responded to the rock structure. Though regular in their broader features they are irregular and deformed in detail.

Deeps and shallows are known in every vigorous river, but it is seldom that they are so prominently developed as in these great cañons. At one point in the upper cañon the river has been broadened into a lake two or three times the average width of the channel and with a scarcely perceptible current; above and below the "laguna," as the boatmen call it, are big rapids with beds so shallow that rocks project in many places. In the Pongo de Mainique the river is at one place only fifty feet wide, yet so deep that the current is almost stagnant. It is in such places that the red forest deer grazes under leafy arcades. Here, too, are the great boa constrictor trails several feet wide and bare like a roadway. At night the great serpents come trailing down to the river's edge, where the red deer and the wildcat, or so-called "tiger," are their easy prey.

It is in such quiet stretches that one finds also the vast colonies of water skippers. They dance continuously in the sun with an incessant darting motion from right to left and back again. Occasionally one dances about in circles, then suddenly darts through the entire mass, though without colliding against his equally erratic neighbors. An up-and-down motion still further complicates the effect. It is positively bewildering to look intently at the whirling, darting multitude and try to follow their complicated motions. Every slight breath of wind brings a shock to the organization of the dance. For though they dance only in the sun, their favorite places are the sunny spots in the shade near the bank as beneath an overhanging tree. When the wind shakes the foliage the mottled pattern of shade and sunlight is confused, the dance slows down, and the dancers become bewildered. In a storm they seek shelter in the jungle. The hot, quiet, sunlit days bring out literally millions of these tiny creatures.

One of the longest deeps in the whole Urubamba lies just above the Pongo at Mulanquiato. We drifted down with a gentle current just after sunset. Strange shrill whistles sounded from either bank, the piercing notes of the lowland cicada, *cicada tibicen*. Long decorated canoes, better than any we had yet seen, were drawn up in the quiet coves. Soon we came upon the first settlement. The owner, Señor Pereira, has gathered about him a group of Machigangas, and by marrying into the tribe has attained a position of great influence among the Indians. Upon our arrival a gun was fired to announce to his people that strangers had come, upon which the Machigangas strolled along in twos and threes from their huts, helped us ashore with the baggage, and prepared the evening meal. Here we sat down with five Italians, who had ventured into the rubber fields with golden ideas as to profits. After having lost the larger part of their merchandise, chiefly cinchona, in the rapids the year before, they had established themselves here with the idea of picking rubber. Without capital, they followed the ways of the itinerant rubber picker and had gathered "caucho," the poorer of the two kinds of rubber. No capital is required, the picker simply cuts down the likeliest trees, gathers the coagulated sap, and floats it down-stream to market. After a year of this life they had grown restless and were venturing on other schemes for the great down-river rubber country.

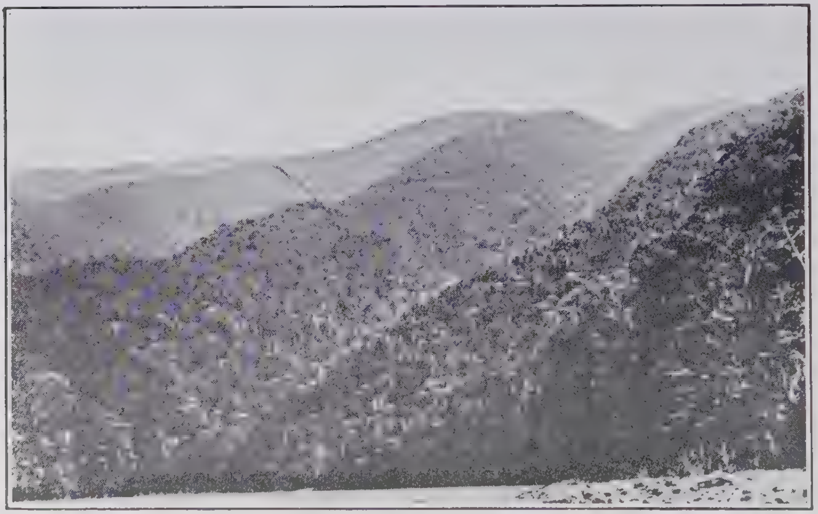

FIG. 7—General or landscape view in the Urubamba at the foot of the Sirialo rapids.

A few weeks later, on returning through the forest, we met their carriers with a few small bundles, the only part of their cargo they had saved from the river. Without a canoe or the means to buy one they had built rafts, which were quickly torn to pieces in the rapids. We, too, should have said "*pobres Italianos*" if their venture had not been so plainly foolish. The rubber territory is difficult enough for men with capital; for men without capital it is impossible. Such men either become affiliated with organized companies before long or get out of the region when they can. A few, made desperate by risks and losses, cheat and steal their way to rubber. Two years before our trip an Italian had murdered two Frenchmen just below the Pongo and stolen their rubber cargo, whereupon he was shot by Machigangas under the leadership of Domingo, the chief who was with us for a part of the time. Afterward they brought his skull to the top of a pass along the forest trail and set it up on a cliff at the very edge of Machiganga-land as a warning to others of his kind.

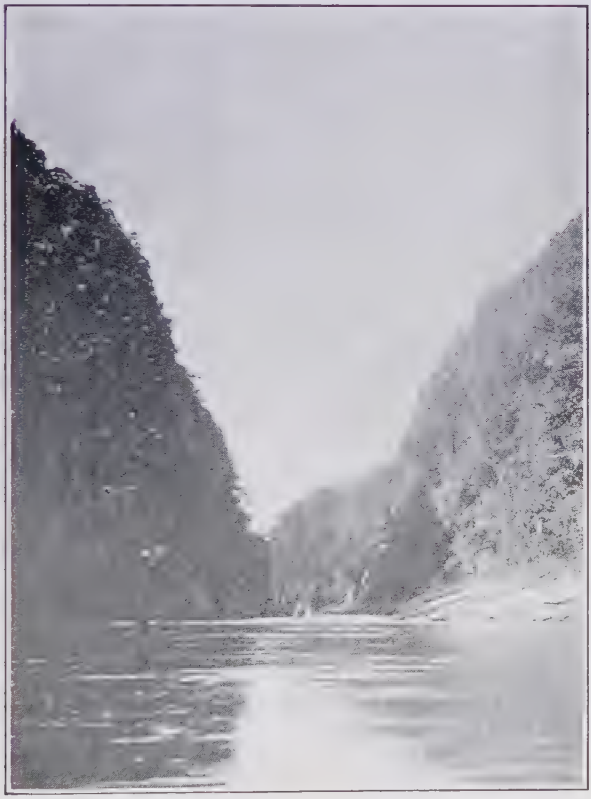

Fig. 8—The upper entrance to the Pongo de Mainique, where the Urubamba crosses the last range of the Andes in a splendid gateway 4,000 feet deep. The river is broken by an almost continuous line of rapids in one of which Major Kerbey lost his entire outfit in 1897.

At Mulanquiato we secured five Machigangas and a boy interpreter, and on August 17 made the last and most difficult portion of our journey. We found the Indians much more skillful and daring than our earlier boatmen. Well-trained, alert, powerful, and with excellent team-play, they swept the canoe into this or that thread of the current, and took one after another of the rapids with the greatest confidence. No sooner had we passed the Sintulini rapids, fully a mile long, when we reached the mouth of the Pomareni. This swift tributary comes in almost at right angles to the main river and gives rise to a confusing mass of standing waves and conflicting currents rendered still more difficult by the whirlpool just below the junction. So swift is the circling current of the maëlstrom that the water is hollowed out like a great bowl, a really formidable point and one of our most dangerous passages; a little too far to the right and we should be thrown over against the cliff-face; a little too far to the left and we should be caught in the whirlpool. Once in the swift current the canoe became as helpless as a chip. It was turned this way and that, each turn heading it apparently straight for destruction. But the Indians had judged their position well, and though we seemed each moment in a worse predicament, we at last skimmed the edge of the whirlpool and brought our canoe to shore just beyond its rim.

A little farther on and we came to the great upper gateway of the Pongo, where the entire volume of the big river flows between cliffs at one point no more than fifty feet apart. Here are concentrated the worst rapids of the lower Urubamba. For nearly fifteen miles the river is an unbroken succession of rapids, and once within its walls the Pongo offers small chance of escape. At some points we were fortunate enough to secure a foothold along the edge of the river and to let our canoe down by ropes. At others we were obliged to take chances with the current, though the great depth of water in most of the Pongo rapids makes them really less formidable in some respects than the shallow rapids up stream. The chief danger here lies in the rotary motion of the water at the sharpest bends. The effect at some places is extraordinary. A floating object is carried across stream like a feather and driven at express-train speed against a solid cliff. In trying to avoid one of these cross-currents our canoe became turned midstream, we were thrown this way and that, and three standing waves broke over us and half filled the canoe.

Below the worst rapids the Pongo exhibits a swift succession of natural wonders. Fern-clad cliffs border it, a bush resembling the juniper reaches its dainty finger-like stems far out over the river, and the banks are heavily clad with mosses. The great woods, silent, impenetrable, mantle the high slopes and stretch up to the limits of vision. Cascades tumble from the cliff summits or go rippling down the long inclines of the slate beds set almost on edge. Finally

appear the white pinnacles of limestone that hem in the narrow lower entrance or outlet of the Pongo. Beyond this passage one comes suddenly out upon the edge of a rolling forest-clad region, the great rubber territory, the country of the great woods.

From the summits of the white cliffs 4,000 feet above the river we were in a few days to have one of the most extensive views in South America. The break between the Andean Cordillera and the hill-dotted plains of the lower Urubamba valley is almost as sharp as a shoreline. The rolling plains are covered with leagues upon leagues of dense, shadowy, fever-haunted jungle. The great river winds through in a series of splendid meanders, and with so broad a channel as to make it visible almost to the horizon. Down river from our lookout one can reach ocean steamers at Iquitos with less than two weeks of travel. It is three weeks to the Pacific *via* Cuzco and more than a month if one takes the route across the high bleak lava-covered country which we were soon to cross on our way to the coast at Camaná.

SURVEY OF THE SIACHEN GLACIER

BY

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Officier de l'Instruction Publique, France

As reported in 1911 in geographical periodicals, Dr. W. Hunter Workman and I, after completing our exploration in the Karakoram Mountains among the Hushe glaciers and those of the Kondus system, crossed to the Saltoro valley and traversed the Bilafond La [Pass] (18,400 feet) to the Siachen* or Rose Glacier on August 19th. We examined it for some distance above the entrance of the Bilafond branch, and visited two of its most important affluents, but it was too late in the season to consider the survey of a glacier the most noteworthy points of which lie at altitudes above 17,000 feet.

The object of the 1912 expedition was to make as detailed a map as possible of the whole glacier and to ascend to and examine its apparently somewhat complex sources, and elucidate, if possible, the problem of their relations to regions beyond. Mr. C. Grant Peterkin, who had received the diploma of the Royal Geographical Society and was kindly recommended to me by Mr. E. A. Reeves, F.R.A.S., agreed to act as surveyor. The Surveyor General of India, Col. Burrard, R.E., also kindly loaned a native plane tabler, Sarjan Singh, from the survey to assist in the work. One Italian Alpine porter accompanied the surveyor's party, and four Italian guides and porters were with Dr. Workman and myself. A Parsee from Srinagar who had handled the transportation detail in 1911 undertook the work this season and was assisted on the Siachen side by two sepoy reservist orderlies from the Pindi Division, Royal Indian Army, who did very good work. Goma in the Saltoro valley was the base of supplies.

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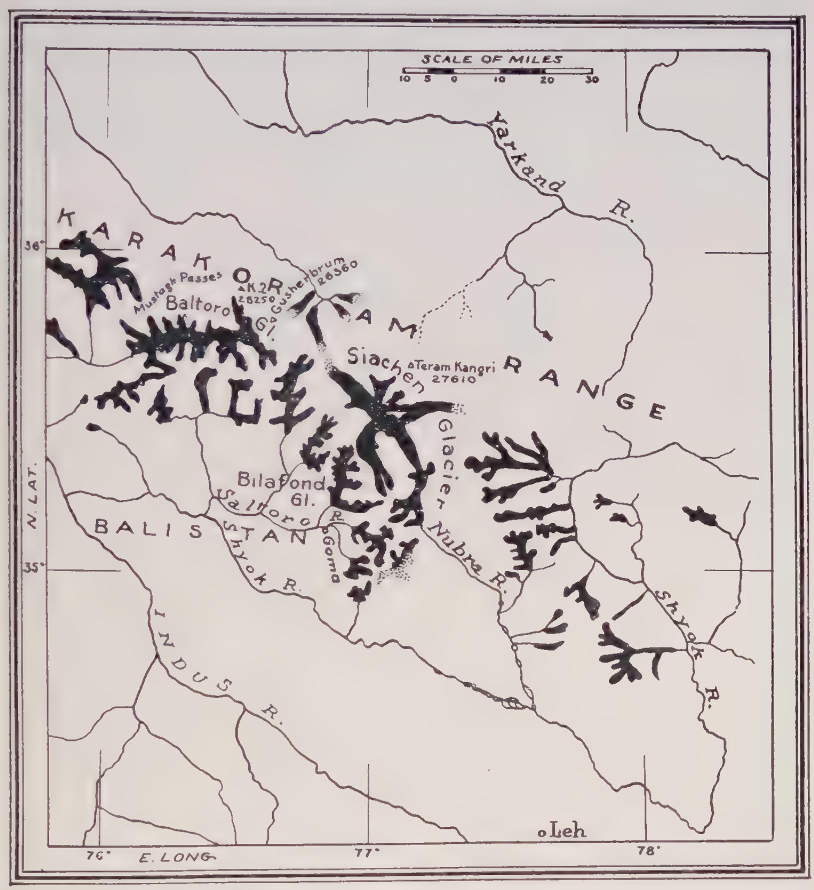
* The largest valley glacier yet known in Asia. Probably fifty miles or more in length.

On reaching the top of the Bilafond Pass on July 11, the weather being very fine, I decided to attempt an impressive rock and snow peak lying above an elevated snow plateau N. W., which was likely to command a wide view toward the upper Siachen. Camping on the plateau at 19,000 feet, the peak was climbed by myself and three guides on the 12th. It proved a difficult mountain, as the last 800 feet were at a very sharp angle and each step had to be cut in a surface of black ice.

From the top I found myself separated from the great double summit K3 (25,210 and 25,415 feet), which heads the Dong Dong glacier only by the wide snow basin on its N. E. side, which we traversed in ascending that mountain to 20,000 feet last season. Its precipitous walls loomed above us with startling grandeur. North and south the vista of glaciers and peaks, some of which I was able to identify, was grand beyond description. Here I can only say that this ascent being possible at the beginning of the journey was of much value, enabling me, as it did, to get a comprehensive idea of the ice region about to be entered. Full light was also thrown upon certain points regarding the Dong Dong and Sher-pi-gang glaciers explored by us in 1911. This peak works out from hypsometric observations available at about 21,000 feet, but heights here mentioned will be subject to change when compared with lower station readings obtained from Skardu.

On reaching the Siachen a sheep and *bursta* camp was set up at our old 1911 base, the Teram Shehr promontory, which abuts the Siachen at the junction of the large northeast affluent. Sheep were kept here, there being no grass above that point, and *bursta* for fuel was collected and sent to higher points. I have named this northeast glacier the Teram Shehr, which is almost the only native name connected with the Siachen of which the oldest inhabitants have a dim remembrance. A flour base camp with a *babu* in charge was made on moraine a little farther up the glacier.

All camps of my own party, except for a few days when we descended the glacier, were at or above 17,000 feet for five weeks and mostly either on moraine-covered ice or wholly on snow, for the Siachen glacier offers no dainty plots of soil or grass to the tent nomads visiting its precincts. The mountain flanks on both sides are so preciptous that it is dangerous to pitch tents on them.



Siachen Glacier and its Surroundings.

As Mrs. Bullock Workman's map material is not yet available, this sketch map, based on Dr. T. G. Longstaff's map (*Geogr. Journ.*, Vol. 35, 1910, facing p. 774) has been prepared to show roughly the position of the Siachen Glacier in relation to the great Karakoram Range and some of the other glaciers and the drainage systems.

Weather did not permit our reaching the sources of the glacier at once. On the first attempt lasting two or three days we camped far up the glacier at 18,000 feet, but were driven down in a stinging snowstorm early the next day. Two weeks of very fine weather, however, soon set in, and we were able to accomplish in this time what, under the usual summer Himalayan climate conditions, might take six weeks of running backward and forward; for, in order to visit what is to be seen at the Siachen sources, clear skies are essential.

Contrary to the usual conditions on this glacier, it was found possible to cut out terraces and camp on a mountain flank at 18,500 feet, just below the high snow fields leading to the north and northeast heads. From here the north saddle or very apex of the Siachen was ascended. This saddle is at an altitude of 20,900 feet. The northeast col was ascended the next day. It is not so arduous as the north one and is less high, about 19,200 feet. We discovered from here some very high peaks beyond the eastern Siachen boundary on the Chinese Turkestan side. These are about seven miles north of Teram Kangri*; one of these peaks is probably well over 25,000 feet, but it is futile to discuss heights of peaks unless one's data can be verified by careful triangulation.

After another climb to a ridge of 19,700 feet for observation and photography, Dr. Hunter Workman and I headed the caravan toward the glacier leading to the Siachen's west source. We descended the main stream crossing to the right orographical side. This glacier enters the Siachen at about 17,400 feet. Ascending it for several hours, we at last found a point free of crevasses, where a camp was pitched on snow at 18,700 feet. We passed three nights here, which made a serious impression on the coolies, there being no lakelets nor recurring streams, so abundant on the main glacier. A peerless white peak, probably 24,000 feet, heads this glacier to the west. The height will later be known more exactly. It is connected by a high col with a lower snow peak, and at the base of this lower peak is another col or depression. The higher col was first ascended, height 19,700 feet, and from it the source of a large glacier was seen about 4,000 feet below where we stood. The following day the lower depression was examined and, as I hoped, it proved to be the main outlet from the Siachen on the west, being the summit of a rather difficult but feasible pass for a loaded caravan to the glacier above mentioned lying west.

Next an ascent was made to a wide snow plateau lying directly under the chief summit of the 24,000 feet peak. The plateau is at least 21,000 feet in elevation and offers very fine views of Hidden Peak, Gusherbrum, and other giants of the region.

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* The Survey of India gives the height of Teram Kangri as 27,610 feet.

Our wonderful weather was now ended, and a snowstorm drove us down to the Siachen. I saw clearly though, that after finishing our work on the lower part, we should have to return to this icy head and leave the Siachen Glacier finally by the passage here discovered.

After we had descended the glacier, the 11th of August found us again on the high Siachen awaiting a chance to advance to the pass. Here fog and snowstorms held us prisoners for nine days. At the beginning of this detention I ordered forty coolies to return under two Europeans over the Bilafond glacier for flour, which was now running short. This brought on a strike which lasted eighteen hours. They refused to go for supplies, saying, if they went, they would not return. Their long visit to the sources had made a deep impression on their minds and they declared they would not return there. Finally, upon the Wazir explaining that, if they crossed the new pass, they would have only two days on snow and then be always on moraine down to villages, they gave in and no further complaint was heard. Flour arrived, and one bitterly cold morning, under a leaden sky, we started with 66 coolies laden with provisions for ten days.

Although it did not appear to be far enough north, we thought the pass might afford a passage to the Baltoro glacier. If not, we should find ourselves probably on the Kondus, which was surveyed in 1911 by our topographer, Dr. C. Calciati. Either way would be new and interesting; the Kondus more novel because bearing no footprints of illustrious predecessors, and from the fact that our expedition in 1911 had not pushed up to its extreme upper portion.

We camped a few hundred feet below the summit of the pass, again on snow in a freezing temperature, for by 3 P.M. it was snowing hard. By 6 o'clock it cleared. After a cool night under canvas, minimum temperature 3° Fahr., we ascended under a deep blue sky to the col. Here a boiling point reading was taken and numerous photographs. The pass works out, pending later data, at 19,000 feet.

Kind indeed was the weather god, who had allowed us, three weeks before, under sunlit skies to discover this new passage, and again, after dreary cold days of waiting, drew back the curtain of mist for a day permitting my caravan to pass safely to the other side under the fairest of skies. The descent to the glacier is about 3,000 feet. It was smooth going for about a quarter of the way down, but after that the surface was seamed from side to side with wide crevasses—abysses treacherously covered by soft snow. We reached moraine for camping below the source of the new glacier, which is over 16,000 feet.

The next day it became evident that we were on the upper Kondus Glacier,* and the worst monster of a glacier to travel on we have met in the Karakoram. After one short march from its head ice bands and easy moraine end, for four days moraine strewn ice hillocks often 400 to 500 feet high had to be steadily clambered over. Owing to danger from stones falling from perpendicular mountain walls on its sides, no camps even to the end of its tongue can be pitched except on the tops of these depressing hillocks.

I am glad to have carried out with fair completeness the task, which has kept me two summers in India, and I think the work will, perhaps, be appreciated by future geographers in the days when the special survey of smaller unknown areas than vast polar continents comes into vogue. At least, not having the pioneer exploring to do, they will be spared the expense, the tedious effort to manage irresponsible coolies, and the many obstacles which the Siachen offers as a region for exploration, such as being separated from all bases of supplies by two glaciers and a snow pass like the Bilafond, and from wood by a distance of at least thirty miles.

Still I am satisfied and pay my deep salaams to the weather god, for, without his aid, the survey of so huge a glacier could not have been completed, nor could I, considering the perfidious actions of the only headmen available and the prodigious pilferings of the Saltoro valley coolies, have had the privilege of first standing on two new points of the northeast Karakoram water parting, of observing their relation to Chinese Turkestan and of attaining other points of geographical interest on this largest and longest Himalayan glacier.

Mr. C. Grant Peterkin and his assistant made a full survey of the Siachen from its sources to the end of its tongue at the Nubra River, including its numerous tributaries.

One of my Italian porters, through momentary carelessness in not testing the ice with his axe, fell into a deep crevasse, carrying with him the only rope with us at the time. He remained there one and a half hours before ropes and guides were available to extricate him, and died of shock and the effects of cold the same night. I was walking directly behind him, and supposing him to be on the watch for crevasses, observed nothing until I saw him disappear, two steps in front of me. I mention this because false stories of the lamentable occurrence, invented by Skardu coolies, were widely published.

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* Some ten miles west of the upper or northern part of the Siachen Glacier.

It is gratifying to me that no coolies in my party were seriously injured or died on the glacier, for the Siachen is incomparably more difficult to travel over than any of the five great Karakoram glaciers, all of which except the Baltoro we know quite thoroughly. An especial danger for loaded coolies is water. In crossing the Siachen opposite Teram Shehr, a distance of about three miles, eleven glacial streams were met with this season. Three were at least ten feet wide and so deep that it was impossible to ford them after 11 A.M.

AMUNDSEN'S SOUTH POLAR BOOK[*]

REVIEWED BY

WILLIAM HERBERT HOBBS
Professor of Geology, University of Michigan

Simultaneously with Captain Amundsen's Continental lecture tour have appeared his complete narrative in German and also the lecture itself save for the illustrations.[†]

The volumes of narrative contain as supplementary chapters: a preliminary discussion of the meteorological observations made at the winter station of Framheim, a brief statement concerning the rock specimens collected (all crystalline rocks), the oceanographical observations (by B. Helland-Hansen and Fridtjof Nansen), and, finally, the scientific proof of attaining the South Pole by Ant. Alexander. The work is dedicated "To the brave little company—my comrades—who one evening on the way from Funchal promised to stand by me in the conquest of the South Pole." It is introduced by Fridtjof Nansen, the polar explorer who designed the *Fram* and whose poleward drift in it made the vessel famous.

As is well known, it was Amundsen's plan to attain the North Pole in a drift across the Arctic pack ice by the method devised by Nansen and all but successfully carried out. When Amundsen was ready to sail, it was, however, with an inadequate outfit, due to a lack of the necessary funds. In August, 1910, as Nansen tells us, Amundsen's friends were surprised by a letter from him informing them that in order to secure the funds which had not been forthcoming at home he would first attain the South Pole. Says Nansen, "People were dumb—they did not know what to say. To gain the North Pole by way of the South Pole!" The great task of reaching the South Pole already accomplished, the doughty captain is now by means of lectures and editions reaping the golden harvest which is to send him fully equipped upon his Arctic quest in 1914.

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[*] Die Eroberung des Südpols. Die Norwegische Südpolfahrt mit dem Fram 1910–1912. Von Roald Amundsen. Einzige berechtigte Uebersetzung aus dem Norwegischen ins Deutsche von P. Klaiber. 2 vols. Fifteen maps and plans, 300 text illustrations and 8 four-color plates after oil paintings by Prof. W. L. Lehmann. J. F. Lehmanns Verlag, Munich, November, 1912. Mk. 22.

[†] "Meine Reise zum Südpol." *Zeitsch. Gesell. f. Erdkunde zu Berlin*, pp. 481–498, 1912. A translation of this paper appeared in the November *Bulletin*, pp. 822–838.

Victoria Land, King Edward VII Land, Coats Land and Wilkes Land being all preempted as starting points by the English, Japanese, German and Australian Antarctic expeditions upon the ground, Amundsen chose as his *point d'appui* the deep indentation of the Ross Barrier situated 404 statute miles distant from Victoria Land, 115 miles from King Edward Land and known as Whale Bay. On comparing the present outlines of the bay with the map of Ross made some seventy years before, Amundsen was overjoyed to find that while elsewhere the margin of this great area of shelf ice had suffered large changes, it had here remained practically unaltered. Such an indication that the shelf ice is locally stranded in a shallow of the sea was confirmed by the observation of surface fractures and irregularities. The winter quarters of the expedition, Framheim, could therefore be established here with every assurance that this main depot of supplies would remain undisturbed.

The decision to lay out the route as nearly as possible due southward from this base proved to be in the main a wise one. Traveling over the generally even surface of the shelf ice is naturally much easier than over the high ice plateau, both because breathing is so much less difficult and for the reason that depots of provisions are separated from the base by no such serious obstacles as the steep and crevassed margin of the inland ice. Framheim was not only some seventy miles nearer the pole than the base of any of the other expeditions, but the shelf ice was found to extend a full hundred miles nearer the pole than along the Shackleton-Scott route. On the other hand, the southeasterly trend of the newly discovered Queen Maud mountain range—apparently a continuation of the Alexandra range in Victoria Land—brought Amundsen's due southerly course for a relatively long distance within the crevassed and otherwise disturbed steeper slopes on the margin of the inland ice. Instead of mounting the slope directly, as did Shackleton where the trend of the ranges favored such a course, Amundsen crossed this difficult zone diagonally. This fact and the trend of the near-by mountain ranges explain some irregularity in wind direction which held up to near the 88th parallel. Here the highest point in the course was reached at an altitude of 10,578 feet, though it was only by consecutive instrumental readings that an extremely slight descent from this position could now be detected. From Shackleton's observations it is evident that the higher surface of the ice dome lies to the westward of his route, and these results must therefore be interpreted as due to the course crossing a radial line upon the surface.

Perhaps the most interesting scientific result of the expedition was the entry near the 88th parallel upon a region, in Amundsen's belief, of permanent calm or light winds and generally clear weather. Here the snow surface is smooth with no indications of drifting. A tent pole, 6.56 feet in length, was thrust down into it to the end without encountering any hard layers. During the fortnight spent within this area the sky was clear except on two days when at intervals snow flurries obscured the sun. The light winds were throughout from the southeast. Once, when some distance within the border of this area, during a short spell of gray weather when it was impossible to see, the course had to be kept by compass. "But, as usual, it brightened again suddenly and our vast surroundings spread out bright and warm around us. We had to take off everything—or nearly everything—and yet the perspiration poured off us." Again, on Christmas Day in latitude 88° 23′ the weather was changeable, at one time clouded, then bright and clear.

On the return the inbound trail was followed and the depots of provisions easily found. The precaution had been taken to set at each station a series of marks running at intervals of a kilometer (.623 of a mile) for a distance of five and a half miles on either side of the course. These marks were pillars formed of snow blocks each tipped by a flag so marked as to give its location in reference to the route. At all stations south of the 80th parallel the route was marked by pillars each built of 60 blocks and numbering 150, a task involving the cutting of 9,000 snow blocks. This contribution to the technique of travel on both inland and shelf ice is likely to be taken advantage of by future explorers, since its merits were so fully demonstrated.

Amundsen's route to the pole measured 864 miles and the complete journey lasted 99 days. The return was made in 39 days, corresponding to an average of about 22 miles per day.

To the generally observed even surface of the Ross Barrier along the route, two exceptions must be mentioned: one, that already noted near Whale Bay, where the shelf ice is evidently aground on a shoal; and the other between the 81st and 82nd parallels, where crevasses and unevenness were likewise encountered. A happy discovery during fine weather on the return has explained the disturbance at the more southerly of the two areas. When near latitude 81° 20′ there was seen far off to the southeast beyond the irregular crevassed surface, a high land area and two white peaks. That this discovery combined with that of the low mountain range trending northeast near the inland-ice margin precludes a separation of East from West Antarctica cannot, however, as yet be assumed. Amundsen's map indicates clearly that two degrees of latitude on either side of this newly discovered land is still unknown. In fact, press dispatches have announced that the Japanese explorer Shirase has proven the separation. Later, and more definite information from both Filchner and Shirase will therefore be eagerly awaited.

A party commanded by Lieut. Prestrud crossed the Barrier near its margin to King Edward VII Land, and on reaching it ascended a rocky elevation 984 feet in height, which in honor of Capt. R. F. Scott was named Scott's Rocks.

The daily meteorological observations were carried out at Framheim, more than 100 miles from the nearest land mass. The results show that the winter was about 12° C. colder than at McMurdo Sound, the station of the English expeditions in Victoria Land. August was the coldest month, with an average temperature of —44.5° C. For fourteen consecutive days of this month the temperature sank to below —50° C., the minimum being —58.5° C., and the maximum for the month —24° C. In summer the temperature never rose above freezing and fell on one occasion to —50° C. The calculated annual temperature is —26° C., which Amundsen thinks the lowest anywhere observed.

The relative moisture of the air for the winter months had an average value of 90 per cent. and was at a minimum in November with 73 per cent. For the absolute moisture the highest monthly average was 2.5 mm. (in December) and the lowest 1 mm. (in August). The maximum daily value was 4.4 mm. (on December 5th).

Measured wind velocities ranged between 1.9 meters per second in May and 5.5 meters in October, an average of but 3.4 meters for the ten months. This low figure is explained by the few stormy days—

only 11 in all. As regards wind direction, the frequency in percentage shows that easterly winds greatly predominate over others (31.9 per cent.), with southwesterly and southerly winds next in order (14.3 and 12.3 per cent.), and calms prevailing a fifth of the time (21.3 per cent.). Southeasterly winds were especially rare. On examining the map it is seen that the position of Framheim with reference to inland ice sufficiently explains these facts. The near mass of plateau-ice is in King Edward Land due eastward, while the more distant ice dome of Victoria Land lies to the southwestward, the winds from the latter suffering an amount of deflection through earth rotation which is dependent upon their intensity.

The air pressure was notably low and constant. Oceanographical observations of great value were carried out during the voyage of some 8,000 nautical miles, and measurements were made at no less than sixty stations.

In a long summary of Antarctic exploration (no less than 112 pp.), which introduces the narrative, it is worthy of note that but fifteen lines are vouchsafed to Admiral Wilkes, the discoverer of the Antarctic Continent. The tenor of this reference is more remarkable even than its length. We quote (pp. 44-45):

"The American naval officer, Lieut. Charles Wilkes, left America on August 18th, 1838, with 6 ships, 83 officers, 12 scientists, and 345 men. On February 17th, 1839, this entire powerful Antarctic fleet lay in the harbor of Oranien in the southern part of Tierra del Fuego. From there the work was distributed among the different ships. Of the results of this undertaking it is difficult to say anything definite. So much is certain, that different explorers have in several places sailed over Wilkes Land. What may be the cause of these erroneous maps it is now impossible to judge. From the effect of the entire voyage it appears, however, that it was gone into as a serious undertaking."

One cannot believe that the above statements were written after a study of Wilkes's report. They sound rather like an echo to some of the hostile English criticism which had its beginning, as is well known, in the bitter resentment of Sir James Ross when he found that Wilkes had forestalled him in the discovery of Antarctica. It is true that both ends of the long stretch of coast line and barrier skirted by Wilkes (some 1,500 miles) have been sailed over; the eastern extremity by Ross, Borchgrevink and Scott in turn, and the western by the Australian explorer, Mawson. The latter has now, after three-quarters of a century, confirmed for the most part the map of the American explorer, and eminent authorities upon the Antarctic who are more lenient than Amundsen (such as Dr. H. R. Mill, Dr. W. S. Bruce and Professor von Drygalski) have found in the almost continuous storms and fogs which Wilkes encountered and in the nature of his unstrengthened ships, a sufficient explanation of the inaccuracies in his map. The wavy lines, almost a repeating pattern, which Wilkes entered upon the map for coast, is in itself sufficient indication that he regarded it as approximate only, masked as it generally was by barrier and huge bergs; but his series of soundings, through establishing the existence of a marginal shelf, confirmed his discovery of the land.

Amundsen himself, in entering upon his own map the extension of the Queen Maud Mountains, has indicated a series of peaks extending 150 miles from a single point of observation situated upon the domed surface of the inland ice, and by a conventional symbol not unlike that of Wilkes he has continued the range another fifty miles into the distance. If future exploration should prove that he has been too optimistic in adding the more remote fifty miles of the range, no one would be warranted in saying of his expedition, "it is difficult to say anything definite."

The edition as a whole is well gotten up, but the paper and text illustrations as well as the low price, indicate that the work is intended for a large general sale and not for a library edition. An English edition is to be issued by Murray and an American by Dutton.

NOTES ON THE DESCRIPTION OF LAND FORMS.—VIII*

The Relations of Geography to Geology.

The Tertiary Gravels of the Sierra Nevada of California. By Waldemar Lindgren. *Professional Paper 73,* U. S. Geol. Survey, Washington, 1911.

The greatest contribution to the regional geography of the United States comes at present from the U. S. Geological Survey, in the form of reports, maps and folios. It is not surprising that a large part of this information, in so far as it is presented in words, should be geologically rather than geographically phrased; that is, that it should be worded in such a way as to turn the reader's attention more to the past history of the earth—the proper domain of geology—than to the present condition of its surface—a proper domain of geography;

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* Professor Davis's earlier contributions to the *Bulletin* under this title appeared in Vol. 42, 1910, pp. 671-675 and 840-844; Vol. 43, 1911, pp. 46-51, 190-194, 598-604, 679-684 and 847-853.

and it is perfectly natural that the information should be for the most part restricted to one section of the physical half of our subject, namely to land forms, while other sections of the physical half and all the ontographic half of geography should be left almost untouched. Attention is here called to these limitations, not in the least in the way of adverse comment on the well prepared geological reports issued by the Survey, but with the object of impressing our geographers with the importance of two supplementary tasks for which they are responsible: one is to rephrase the geographical material that they find in the Survey publications so as to place the proper emphasis on existing features; the other is to go on from the excellent beginning thus provided and complete the full-fledged geographical treatment of the districts concerned by adding appropriate climatic and ontographic chapters. Because one geographer specializes upon climate, and another upon land forms, and a third and a fourth upon botanical and human problems, it does not follow that any one of these specialists regards his work as constituting the whole of geography or as being more important than any other part; his work is simply the part of geography to which he is, for one reason or another, giving particular attention. If any well prepared student of the entire content of geography will combine all its parts into a well rounded whole, all the specialists will rejoice. Truisms of this kind must sometimes be explicitly stated, so as to correct misunderstandings.

Lindgren's report on the Tertiary gravels of the Sierra Nevada opens with an "outline of the later geological history" of the region, which illustrates very well the kind of non-geographical information that a geographer ought to have, because it serves so well as a background for the facts that he wishes to place in the foreground. Then comes a page on "topography," which seems to have been intentionally restricted to an empirical style, and which is certainly excellent for a description of that kind; it might be quoted as it stands by geographers who prefer the empirical over the explanatory form of treatment. It includes, however, perhaps by accident, a few explanatory phrases, such as "streams have trenched deep canyons" and "a deep basin . . . . filled with alluvium"; and in view of this it is difficult to understand why the abrupt eastern slopes of the range are here described simply as "escarpments," instead of as "dissected fault scarps," particularly as the origin of the escarpments by faulting has been explicitly stated a few pages earlier. It is indeed curious why an author, who can with proved competence find his way through the complex geological history of the region, or why a Survey which has done so much towards establishing the verity of the principles of explanatory physiographic description, should hesitate to treat the subject of "topography" in an explanatory manner, instead of implying by the adoption of an empirical treatment that in their opinion such treatment is the proper one for use in a "professional paper" for expert readers.

Thirty pages with excellent plates treat of "general geology," and this treatment is, of course, in thorough-going explanatory style. These are followed by several more pages, giving a "summary of the history of the range." Then comes the main body of the paper, describing the gravels more in detail and including separate chapters for each map quadrangle. Many paragraphs here merit a geographer's study, but it is in the preceding pages that he can most directly learn what he ought to know in order to prepare an explanatory physiographic description of the central and northern parts of the Sierra. No better exercise can be given to an advanced student, who wishes to gain expertness in such description, than to rephrase the pertinent parts of this report in a geographical style, whereby the attention shall be held upon existing features, instead of being directed to the successive stages of their past history.

The range consists of a great mass of folded sediments, intruded by granites; the structural trends are from north-northwest to south-southeast. Three cycles of erosion are recognized, the second being closed by deposition of gravels and eruption of lavas before the opening of the third. Flat-topped ridges and highlands of gentle outline, sometimes surmounted by monadnocks especially along what was probably then the crest of the range, tell of the long continued erosion of the first cycle, whereby the lofty mountains initiated by folding and intrusion were for the most part planed down to a surface of comparatively small relief. The present westward slope of the undulating highlands and their abrupt eastward termination by dissected fault scarps, somewhat on the interior side of the supposed earlier crest line, indicate the monoclinal tilting by which the second cycle was introduced. The erosion next performed is proved by the mature transverse and longitudinal valleys, 1,000 or 2,000 feet deep, whereby the highlands are abundantly dissected and in some places reduced to narrow hard-rock ridges; the best preserved highlands are in the granite areas, while some of the ridges follow greenstone belts near the present western base of the range; but a weaker granodiorite area was reduced to low relief and now rises gradually from the valley-plain of California, thus serving as a path of first ascent for the Central Pacific railroad. Heavy gravel beds, repeated lava flows, and broad floods of tuffs and breccias aggrade the mature valleys of the dissected highland. The work of the third or current cycle is seen in the narrow, steep-side canyons eroded from 1,000 to 4,000 feet beneath the gravels and lavas in the earlier mature valleys, the form of which is sometimes shown in section in the canyon walls. The dislocation of certain lava flows on the line of the eastern scarps, some of which now measure 5,000 or 6,000 feet in height, shows that the earlier faulting was renewed, probably about contemporaneous with the revival of erosion on the western slope; but the author insists that the renewed faulting is alone not sufficient to produce the increased slope of the canyon-cutting rivers.

German Adoption of Explanatory Descriptions.

BEGLEITWORTE ZU DEN "40 BLÄTTERN DER KARTE DES DEUTSCHEN REICHES 1:100,000, ausgewählt für Unterrichtszwecke, herausgegeben von der königlich Preussischen Landesaufnahme." By Walter Behrmann (*Zeitsch. Ges. f. Erdk.* Berlin, 1911, 601-624, 677-701).

As a sequel to the recent completion of the 1:100,000 map of Germany, forty sheets selected by the Prussian Survey office are offered for sale to German schools for six marks; and the Geographical Society of Berlin will add to each set a copy of the explanatory text, above cited. This liberal action must contribute to the further cultivation of geography in a country where its study is already far advanced, and all the more because an explanatory style of description has been adopted in the semi-official "Begleitworte." At the same time it is interesting to note that the chief difficulty which Behrmann found in preparing his text, which is intended for teachers and students, was due to "the insufficient morphological investigation of the Fatherland"; he met in the study of the maps many problems which are not yet discussed in geographical literature. Among numerous excellent examples, mention may be made of Sheet 46, Neustadt in West Preussen (northwest of Danzig), which includes a well defined meandering valley, incised in drift and abandoned by the large river that eroded it—probably the Vistula, when it was reinforced by ice-water and deflected westward by the retreating ice sheet—the valley now being occupied only by small streams, two of which have deposited fans on its floor opposite the ravines that they have eroded in the bordering uplands. Sheet 336, Goslar, includes the northern border of the Harz and the adjacent lowland; the Harz mass is a fault block, consisting of strongly folded Paleozoic rocks, trending southwest-northeast, and showing a highland, 500-600 meters, of subdued forms ("eingerumpft," indicating a less advanced stage of erosion than "eingeebnet"), surmounted by the granitic monadnock of the Brocken, 1,142 meters, bordered by a fault-scarp, and sharply dissected since its uplift. The piedmont area consists of inclined Mesozoic strata, trending northwest-southeast, reduced to longitudinal lowlands and ridges of small relief.

Sheets 469, Annaberg, and 494, Wiesenthal, present the gentle northward slope and the sharply dissected interior fault-scarp of the Erzgebirge, the mass of which consists of deformed schists and gneiss reduced to an old surface, now seen as an uplifted peneplain, surmounted by basalt mesas capping sandstones elsewhere stripped away; the slanting peneplain is incised by consequent streams, the headwaters of which still flow in shallow highland valleys, while the middle stretches are more deeply incised, sometimes with meandering courses (and the lower parts are shallower again near the northern base of the mountains). The crest is moor-covered, and surmounted by (residual?) summits; the southeastern scarp, of simple or compound displacement, 4-500 meters in relief, is strongly dissected; large fans are spread out beneath its ravines, sometimes covering a lowland of crystalline rocks like those in the mountain crest. Sheet 504, Cochem, shows the central highlands of the Schiefergebirge, which consist of folded Paleozoic strata, striking northeast-southwest, reduced to a peneplain, above which quartzite ridges survive as [linear] monadnocks and on which the Mosel once flowed in a freely meandering course; a post-Miocene uplift caused deep incision by the meandering river; the spurs entering its curves exhibit finely developed undercut and slip-off slopes (*Prall- und Gleithänge*); the side streams cut sharp ravines. A belt of weak strata, a little north of the Mosel, has been etched out to a lowland, known as the Wittlicher Senke. Other examples show the dissected fault-scarps of the Odenwald (558), Schwarzwald (644), and Vosges (642); the cuestas (*Stufe*) near Metz (568), and south of Stuttgart (590, 606); the capture of a Danube branch by the Wutach (645), and so on.

The explanatory terminology, although here carried much farther than is usual in German essays, is not always uniform. Consequent rivers are described as *konsequent, Schichtflüsse,* and *Abdachungsflüsse;* subsequent is used rarely, although streams and valleys of subsequent origin are often mentioned. The time-names of geological formations are reduced to what may be called a German minimum, for their number is far below the measure ordinarily found in the geographical articles of German authors over-learned in geology. The use of such terms as Paleozoic and Mesozoic, intentionally repeated in the above abstracts so as to preserve the flavor of the original, is unfortunate, because it will give to the teachers and students of geography, to whom the *Begleitworte* are addressed, the impression that a geographical end is best served by mentioning the age of the formations concerned; whereas what the geographer needs, in forming his conception of the landscape, is not the geological age of the underlying rocks, but their composition and attitude. When it is said that the Schiefergebirge suffered "a post-Miocene uplift" the reader's thoughts are more or less turned aside from their proper course; what he needs to know is not the geological date of the uplift, but the present stage of dissection of the uplifted mass. It may be briefly noted that the bordering escarpment of the Harz is probably not, as here described, a fault-scarp in the sense that it was directly produced by faulting, but a fault-line scarp, in the sense that it has been produced by the action of erosion in removing the weaker part of a faulted mass and exposing the formerly subterranean fault-surface of the stronger part.

Rational Geography.

THE GEOGRAPHY OF GODAVARI—A DISTRICT IN INDIA. By S. W. Cushing. *Bull. Geogr. Soc. Philadelphia,* Vol. ix, 1911, pp. 7-25.

The Carnatic lowland along the eastern border of India has been described on the basis of scanty statements in the publications of the Geological Survey of India, as a young coastal plain, and as such has been regarded as an important member of its class. Opportunity for its further study came through the appointment of S. W. Cushing, of the State Normal School at Salem, Mass., to a Sheldon fellowship of Harvard University, whereby he was enabled to visit India two years ago and examine the Carnatic with some care, with the result of discovering that it possesses more varied features than had been supposed. A preliminary report of his work, quoted above, may be cited as a thoroughly rational treatment of a problem in regional geography. It first gives six pages to an explanatory physiographic account of the Godavari district; it then presents several sections on the relation of the physiographic features to the distribution, density and occupations of the people, to religion and to means of transportation. A section on climate might be advisedly added.

The six pages on land forms give a lucid account of the elevated and dissected peneplain of the inner highland, or Eastern Ghats, and their isolated outliers; of the great slope, apparently a huge sea cliff, by which a descent of 2,000 feet is made from the highland to the Carnatic lowlands, and of the three longitudinal divisions of the lowlands. The inner division, some twelve miles wide, is regarded as a plain of marine denudation, cut across the same metamorphic rocks that rise in the Ghats; the middle division is a mature belted coastal plain, about ten miles wide, with one or more cuestas rising outside of its inner lowland; and the outer division is a low and young coastal plain, with smooth surface and dune-bordered shore line. The Godavari river cuts across all these features, and has built a large projecting delta-plain. The verbal description is easily understood alone; but it is made still more readily intelligible by good photographs and especially by a well-designed but rather roughly executed block diagram, the value of which is so great that it must encourage other geographers to give similar graphic aids to their text. Practically all the elements of the topography are thus brought into systematic relation with one another; the physiography of the whole district is concisely described, effectively illustrated and easily conceived.

In the ontographic sections of the article, many items are brought into causal connection with appropriate physical features, and thus the entire geographical story is well knit together. How can a better idea of the location of a village be given than by saying that it stands "on a partial bridge of sandstone extending from the principal cuesta toward the oldland"? How can the opportunities for irrigation be better set before the reader than by generalizing them in a special block diagram, which with the text shows in the clearest manner how the "tanks" or reservoirs are related to the consequent, subsequent and obsequent streams of the cuestas. And yet the possibility of thus concisely pointing out the relation of human occupations to physiographic environment rests on a method of study which a British geographer has lately characterized as "an insane concentration on land forms." Mr. Cushing's fuller report will be looked for with interest.

W. M. Davis.

GEOGRAPHICAL RECORD

THE AMERICAN GEOGRAPHICAL SOCIETY

Regular Meeting of the Society. The first regular meeting of the Society for the season 1912-1913 was held at the Engineering Societies' Building, No. 29 West 39th Street, on Tuesday evening, November 26, 1912. Vice-President Greenough in the chair. The following persons, fifty-three in number, recommended by the Council, were elected to Fellowship:

Henry S. Adams,
Charles W. Anderson,
William D. Appleton,
Allison V. Armour,
Francis Tuttle Armstrong,
Lyndon K. Armstrong,
H. D. Auchincloss,
Charles A. Baldwin,
Herbert Barber,
Edward W. Barnes,
Edward Bell,
Philip Berolzheimer,
Cyrus T. Brady, Jr.,
L. F. Braine,
Chester A. Braman,
Frederick F. Brewster,
Arthur L. Cahn,
R. Bishop Canfield,
Mark A. Carlton,
Talbot R. Chambers,
Ambrose R. Clark,
Johh William Clark,
Mrs. Elizabeth Colt,
John Henry Darling,
William B. Davenport,
Henry C. Demming,
Henry Doscher,
John R. Drexel, Jr.,
Coleman du Pont,
I. N. Dutt,
Stanley Dwight,
W. L. Emery,
Amos W. Farnham,
José Ferenck,
C. Harold Floyd,
William F. Fluhrer,
Frank R. Ford,
Justus Miles Forman,
George C. Fraser,
John Shaw French,
Frederick W. Gordon,
Henry William Guernsey,
Charles J. Harrah,
Edmund Otis Hovey,
Miss Annie B. Jennings,
Julian H. Kean,
A. Wilder Pollard,
George A. Plimpton,
Augustus J. Rollé,
Benjamin Frank Seaver,
Charles Samuel Tater,
Daniel E. Willard,
J. Edmund Woodman.

The recommendation by the Council that Mr. Vilhjálmur Stefánsson, the Arctic explorer and ethnologist, be elected Corresponding Member was presented to the Society and Mr. Stefánsson was duly elected.

The Rev. George Kinney, B.A., addressed the Society on "The Conquest of the Northern Canadian Rockies" with lantern illustrations.

Special Meeting of the Society. A special meeting of the Society was held at the Engineering Societies' Building on Tuesday evening, December 12. Vice-President Greenough in the chair. A large audience listened to an address by Leon Dominian, B.A., formerly of Constantinople, on "The Balkan Peninsula." The lecture was illustrated by a large map and 80 typical views showing many aspects of the various Balkan states and their inhabitants. Mr. Dominian especially emphasized the geographical conditions that had made the Peninsula for many centuries the main highway between Asia and its European extension; and the national characteristics and aspirations of the Balkan races that have shaped their policies and their interrelations.

The Medal to Capt. Amundsen. The Charles P. Daly Medal for Geographical Research, voted to Capt. Roald Amundsen in recognition of his achievement of the Northwest Passage and his discovery of the South Pole will be presented to him at the meeting to be held at Carnegie Hall on January 14, when the explorer will describe his sledge journey to the southern apex of the earth.

EDWIN SWIFT BALCH A COUNCILLOR. At its November meeting the Council elected Mr. Edwin Swift Balch of Philadelphia as one of the Councillors of the Society. Mr. Balch has long been a member of the Society and has written a number of papers for the *Bulletin* in which he especially discussed Antarctic exploration and problems.

THE SOCIETY'S EXHIBITION OF PHOTOGRAPHS. The Society's Exhibition, open to the members and the general public for ten weeks in the two large rooms on the first floor, was closed on December 5. The collection comprised over 700 photographs illustrating the scenic aspects of the western half of the country, views in the North Carolina Appalachians, and a large number of typical views showing activities in the western and southern states, such as irrigation, dry farming, fruit raising, truck farming for northern market, panoramas and other views of cities, etc. Many cities, railroads and individuals contributed by their exhibits to the success of the enterprise. The attendance was over 2,500.

THE BULLETIN INDEX. The index to the present volume will be issued separately as soon as possible and mailed to all who receive the *Bulletin.* It will continue the *Bulletin* pagination so that it may appear at the end of the bound volume. As usual, it will be an analytical index with references to several thousands of items, conspicuous in the year's output of geographical literature and maps. The index will continue to be helpful to working geographers by guiding them to the most recent writings and maps relating to their various fields of study.

SOUTH AMERICA

A FRENCH DELIMITATION COMMISSION IN BOLIVIA. At the request of the Bolivian government, a French commission will have charge of the delimitation of the boundary line between Bolivia and Peru as well as between Bolivia and Argentina. The total length of frontier involved is about 500 miles. Captain Mailles of the French army will have charge of the mission. Lieut. Vincent will be his assistant. It is hoped that the undertaking of these explorers will allow them to gather data of scientific value while not actually engaged in their duties. (*Jour. de la Soc. des Amér. de Paris. Nouv. Sér. Vol. IX, Fasc. 1, 1912.*)

AFRICA

CARTOGRAPHIC WORK IN MOROCCO. In a communication dated from Casablanca on Nov 8, 1912, Capt. Bellot, chief of the Moroccan topographic bureau, writes to *l'Afrique Française* (Nov. 1912, p. 437) giving an account of the progress of cartography in the new French protectorate.

The work of mapping Morocco was begun shortly after the landing of French troops at Casablanca. At the beginning of 1908 a topographic bureau was organized for the purpose of surveying the newly occupied territory. A number of topographers and geodesists of the Service Géographique de l'Armée were detailed for this work. The Service Géographique meanwhile proceeded also with its own surveys in Morocco. While the two organizations worked independently of each other, the general plan adopted was to have the topographic bureau undertake the preliminary work while the Service Géographique was entrusted with the final mapping of the various districts surveyed.

The slow but methodical occupation of the Chaouïa region gave time to the workers of the Bureau Topographique to prepare a number of reliable maps between the years 1908 and 1911. Among these, the map of the Chaouïa on a scale of 1:100,000, consisting of the Casablanca, Settat, Oulad-Said, Boubeker and Mechra-Ech-Chair sheets, are noteworthy. The military raids undertaken during this period also enabled the Bureau Topographique to prepare a number of itinerary maps of regions which were until then very imperfectly known. The Tadla raid in 1910 gave rise to the 1:200,000 Tadla itinerary maps, while the well-known march to Fez in 1911 was followed by the Fez itinerary map on a scale of 1:100,000.

Since the beginning of 1912 the Bureau Topographique was placed exclusively at the disposal of the local military commander-in-chief and its work since then has been confined to mapping as required by military exigencies, the regular work of mapping Moroccan territory being entrusted entirely to the Service Géographique de l'Armée.

Between March and July, 1912, an area extending over 4,680 square miles was surveyed by this department. Three sheets entitled Rabat, Meknes and El-Ksar are about to be published as a result of this work. At present the troops are provided with a preliminary map printed at Casablanca and consisting of the sheets entitled Rabat, Mamora and Oued Sebou on a scale of 1 : 100,000.

According to Captain Bellot's statements the Bureau Topographique may be considered as a sort of cartographic intelligence department. The members of its staff accompany the expeditionary columns and take part in all the operations on new territory. Itinerary and reconnaissance sketch maps are prepared by them along the entire periphery of the zone of occupation and often beyond the most advanced outposts. These preliminary maps are then assembled at headquarters to form a reconnaissance map on a scale of 1:200,000 which constitutes the most important work of the Bureau Topographique. The sheets are in a state of constant revision as new data are accumulated. This necessitates issuance of successive editions in rapid sequence. About 2,500 copies of maps are issued monthly at present and it is expected that this number will be increased considerably in 1913.

By the middle of November, 1912, the preliminary work of the Bureau Topographique had attained the Fez, Meknes, Rabat and Chaouïa regions. The districts south of the wadi Tensift and east of the Mechra ben Abbou-Marakesh line will be surveyed this winter while the Service Géographique will cover the Doukkala-Abda pacified zone. Maps of these districts will be published at an early date.

Apart from the 1:200,000 reconnaissance map a number of special sheets have been prepared. The Rabat-Fez, Larache and Chaouïa specials have already been published. Each conveys an adequate idea of the importance of the military work confided to the Bureau Topographique. The progress of cartography in Morocco is a fair gauge of the successive stages of French penetration in that country. LEON DOMINIAN.

ASIA

AN AEOLIAN CITY. V. A. Obruchev, Professor of Geology in the University at Tomsk, writes, in Russian, a paper with this title* describing some remarkable examples of desert wind erosion. The "aeolian city" is in the western part of Chinese Dzungaria, between the Kobuk R. and the eastern end of the Djaïr Mountains. The locality is called Orkhu, or Urkho, by the natives. This district has not hitherto been described. The Pevtzov Expedition camped near it in 1890. In Obruchev's two journeys (1906-07 and 1909) he carefully studied the region and took over one hundred and fifty photographs. Perhaps no other desert region has been more curiously and fantastically diversified by wind erosion than this district. The area covered by these objects is about thirteen miles long and ten miles wide. Standing under the sun of Central Asia and subject to extreme continental climatic conditions, the region is composed of horizontal beds of sandstone and clay of Mesozoic age and in part of Tertiary formations. Three ridges rising some hundreds of feet above the general level cross the area and it is these ridges that have been so marvelously cut and carved by the sand-bearing winds. The illustrations show in much variety masses of stone carved into the semblance of castles, towers, turrets, obelisks, pillars, perpendicular or inclined, and one object, named "witch tower" by the explorer, shows an excellent profile of the human face. Many of these objects, in sculptural process, have been completely separated from the ridge of which they formed a part, thus standing alone. In other places the ridges preserve their integrity excepting that their surface has been elaborately eroded.

The scene of this denudation is entirely waterless, though a little desert vegetation is found on the floors of the larger valleys. In the valley leading to the Shar-toch spring there is, however, a bit of an oasis covered with scrub and poplars as well as grass, the area being irrigated by the Diam River at flood time. Here the Mongolians lead their herds. Rare but copious rainstorms sometimes occur. Violent windstorms from the west, at intervals of from ten days to a month, occur both in summer and winter, and it is during these periods, naturally, that the process of rock carving is most intense.

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* Reprint from *Zemleviedienye*, Vol. 18, 1911. 22 pp. Map, ills. Moscow, 1912.

H. DE HUTOROWICZ.

POLAR

AMERICAN ARCTIC ENTERPRISES. It is expected that the Crocker Land Expedition will start for the Smith Sound Region, North Greenland, early next summer to carry out some of the plans for which it was organized late in 1911. It will be remembered that the expedition did not sail in 1912 because of the lamentable death of its leader, Mr. George Borup (*Bull.*, Vol. 44, June, pp. 429-431, 1912). Dr. D. B. MacMillan will command the expedition and will be adequately supported by a small scientific staff. The party expects to be in the field three years. It is the intention to reach and map Crocker Land, which Commander Peary believed he saw in 1906 about 125 miles to the northwest of Cape Thomas Hubbard, the northern terminus of Axel Heiberg Land. A far greater and more important feature of the work will be an attempt to travel westward on the northern side of the Parry Archipelago for the purpose of ascertaining, by soundings, the position of the continental shelf in this part of the Arctic Ocean. In the effort to carry out this most desirable work the expedition will have to reconstruct in some respects the programme at first prepared for it.

Mr. V. Stefánsson is now preparing to return to the American Arctic early next summer and expects that his expedition, whose work will be chiefly geographical, will spend three winters and four summers there. The design is to complete the mapping of the coast lines of Victoria Island and Prince Patrick Island and to make three off-shore journeys. The first to the west or northwest from the northwest of Banks Land, the second west and the third north from convenient points on Prince Patrick Island. The main objects of these journeys will be the discovery and delineation of new land if there be any within reach or the determining of the continental shelf if no land be found. Tidal and meteorological observations will be systematically taken at two or more stations; and geographical data of other sorts will be gathered as far as the size of the staff of the expedition shall permit. One member of the staff will be a geologist. Mr. Stefánsson will also endeavor to determine the former range of human occupation of the Arctic Islands and the character of the culture of their inhabitants. Further archæological and ethnological studies will be carried on.

It is too early as yet to give the detailed plans of the two expeditions. All the money involved in these enterprises will be well expended if the two parties succeed in outlining the position of the edge of the continental shelf to the north of the Arctic islands. In the opinion of the leading polar authorities the completion of this work will show conclusively whether any land masses exist to the north of the most northern coasts now established in the American Arctic Archipelago.

It is expected that both expeditions will be adequately equipped with men and supplies for a long sojourn and the achievement of the best attainable results.

RETURN OF DR. R. M. ANDERSON. Dr. Anderson of the American Museum of Natural History, who has been for four years past with Mr. Stefánsson in the American Arctic collecting specimens of animal life for the Museum, arrived in San Francisco on Nov. 1 and a few days later in New York. His collections number about 1,000 specimens of mammals and birds. He returned some weeks later than Mr. Stefánsson owing to the necessity of shipping and caring for his collections, which were finally packed away on the steam whaler *Belvedere,* Capt. S. F. Cottle, at Cape Bathurst. The whaling season was not closed and the cruise after Dr. Anderson went on board was north through Beaufort Sea to Banks Land, then west, passing Point Barrow on Sept. 28 and steaming on to Herald Island before turning homeward through Bering Strait.

Dr. Mawson's Antarctic Expedition. The *Aurora,* Dr. Mawson's vessel, returned to Wilkes Land in November to bring Mawson and his party back to Australia. The *Geographical Journal* (Nov., 1912, p. 567) says that the *Aurora* arrived at Lyttelton Harbor, N. Z., on July 16, after completing a winter cruise in eastern sub-Antarctic waters. Four days were spent in the neighborhood of 140° W. Long. searching for the reported Royal Company Islands, but they were not found and Captain Davis says they do not exist where laid down on the chart. There may, however, be land in that vicinity, but the sounding machine could not be used on account of bad weather, and so this means of finding indications of shoaling or otherwise was not available. The wireless station at Macquarie Island was working well, daily weather reports being sent to Melbourne, Hobart and Wellington. The operator believes that his messages were received at Mawson's base camp in Antarctica, but as part of that apparatus is damaged the operator there was unable to transmit messages to Macquarie Island.

OBITUARY

Francis McNeil Bacon. Mr. Bacon, for thirty years a member of the Society and for twenty years a member of the Council, died on Sept. 21, 1912. A minute adopted by the Council, at its meeting on Nov. 21, said in part: "Mr. Bacon was an extensive and observant traveler, of excellent judgment and rare executive ability. He was much interested in this Society and did much to promote its success. By his uniform courtesy and consideration he endeared himself to all who had relations with him. In him the Society has lost a wise councillor, a diligent officer and a loyal supporter."

Andrew G. Agnew. Mr. Agnew, a member of the Society since 1885 and elected to the Council in 1908, died on Oct. 6. In the resolutions adopted at its November meeting the Council expressed its appreciation of Mr. Agnew as a useful and valued member whose sound judgment and charming personality had earned for him the admiration and affection of his fellow members.

GENERAL

Change of Publication: Erratum. In a note entitled "Change of Publication" in the August *Bull.* (Vol. 44, No. 8, 1912, pp. 610-611) it was inadvertently stated that the "Veröffentlichungen des Instituts für Meereskunde, etc.," had been amalgamated with the "Geographische Abhandlungen" and that the former had ceased to be published. This is not the case. Both publications continue, but each begins a new series. The Geographical Institute of the University of Berlin, however, severs its connection with the Veröffentlichungen des Instituts für Meereskunde and becomes sponsor of the Geographische Abhandlungen. The complete titles of the two publications since the inception of their new series are, therefore: "Veröffentlichungen des Instituts für Meereskunde an der Universität Berlin: Neue Folge" and "Geographische Abhandlungen: Neue Folge," with the sub-title "Veröffentlichungen des Geographischen Instituts an der Universität Berlin." The former publication has been divided into two series, *viz.:* "A. Geographisch-naturwissenschaftliche Reihe" and "B. Historisch-volkswirtschaftliche Reihe." In Series A two numbers have already been published: "Untersuchungen über das Pflanzen- und Tierleben der Hochsee" by H. Lohmann (Heft 1) and "Tiefenkarten der Ozeane" by Max Groll (Heft 2). In Series B one number has been issued: "Die Grundlagen der Schiffahrtsstatistik" by Walter Vogel (Heft 1). The first number in the new series of the Geographische Abhandlungen, which constitutes No. 1 of Vol. 10, is entitled "Die Übertiefung des Tessingebiets" by Hermann Lautensach.

The Veröffentlichungen des Instituts für Meereskunde, since their inception in 1902, have been and are being published by E. S. Mittler & Sohn of Berlin. The Geographische Abhandlungen, from their inception in 1886 to 1903, were published by Eduard Hölzel of Vienna, subsequently (beginning with Vol. VII, No. 2 or No. 3) they have appeared under the imprint of B. G. Teubner of Leipzig and Berlin.

GEOGRAPHICAL LITERATURE AND MAPS

(INCLUDING ACCESSIONS TO THE LIBRARY)

BOOK REVIEWS AND NOTICES

(The size of books is given in inches to the nearest half inch.)

NORTH AMERICA

The Canadian Rockies: New and Old Trails. By A. P. Coleman. 383 pp. Maps, ills., index. Charles Scribner's Sons, New York, 1911. 9 x 6.

Dr. Coleman's book is noticeable as marking in one man's experience the beginning of and the growing interest in the Selkirk-Rocky Mountain region as a summer playground. In 1884, the date of his first visit, the valley trails were known to few, white or Indian; the literature limited to the rather indefinite accounts of early explorers and hunters, the most important being Palliser's Journal. As late as 1895 the Dominion Topographical Survey professed ignorance of details outside a known strip along the Canadian Pacific Railway. Geographically, interest centers in Dr. Coleman's attempts to reach the mythical giants, Mt. Brown and Mt. Hooker, reported to be the highest peaks between Mexico and Alaska. It is given to few men to remove mountains, and the accomplishment of this was the more dramatic as difficult trails and uncertainty of exact location delayed success until the third attempt. Mt. Robson, the real giant of the Canadian Rockies, is the hero of the last two expeditions (1907-1908). Three attempts, one from the south in the earlier, two from the northeast in the latter years, failed to gain the summit, an honor falling to Mr. Kinney, a member of Dr. Coleman's party, the preceding summer, in 1909. The earlier expeditions (1884, 1885, 1888), deal with exploration in the Selkirk region, unconsciously foreshadowing the attraction of that region for the early mountain climbers, who, like Dr. Coleman, later abandoned it for the more accessible Rockies. Covering more in time and space than any book on the region yet published, easily followed by means of an excellent map, it is especially recommended to a reader having leisure for but one book on the subject.

C. S. Thompson.

SOUTH AMERICA

South America. Observations and Impressions. By James Bryce. xxiv and 611 pp. Maps, index. Macmillan Co., New York, 1912. $2.50. 9 x 6.

This record of observations and impressions during a journey through western and southern South America from Panama to Argentina and Brazil via the Straits of Magellan, while not written by a geographer, bears testimony to the fact that its compiler would have attained as much eminence in our field as he has acquired in his own had he chosen geography as his life work. That he has more than a passing knowledge of this science is well known to those who have heard his addresses before scientific bodies at Washington. The book therefore does not lack scientific merit. Above all it reveals a keen discernment of true values.

The first part contains a description of the scenery and of social and economic phenomena in the seven republics of Panama, Peru, Bolivia, Chile, Argentina, Uruguay and Brazil. This is followed by a survey of the relics of prehistoric civilization and of the native Indian population. A wide degree of familiarity with these subjects is displayed, together with fruitful application of trained thought on themes however new to the mind. The relation between South American, in contrast with North American and European conditions, is always in view, and the interest and educational value of the book are thereby enhanced. Mr. Bryce asks and gives his views on such questions as "What type of manhood will these South American countries develop?" The significance of his work is, however, most emphasized from the economic standpoint. The chapter entitled "Some Reflections and Forecasts" is one which no student of contemporary South American growth can afford to ignore. It is here that the author's wide experience with men and in public affairs is made manifest.

The reader is often reminded of the fact that no account whatever is taken by the author of the political questions which interest our southern neighbors. It is doubtless wise for a man in Mr. Bryce's position to take this attitude, but the reader cannot help regretting that he is deprived of the benefit of Mr. Bryce's vast experience in such matters. The book, however, offers so much food for thought in other directions that it will be an inspiration and a help.

LEON DOMINIAN.

AFRICA

Die Pflanzenwelt Afrikas insbesondere seiner tropischen Gebiete.

Grundzüge der Pflanzenverbreitung in Afrika und die Charakterpflanzen Afrikas. Von A. Engler. 1. Band, 1. u. 2. Hälfte: Allgemeiner Überblick über die Pflanzenwelt Afrikas und ihre Existenzbedingungen. 1. Hälfte, xxviii and 478 pp.; 2. Hälfte, xii and 551 pp. (pp. 479–1029). Maps, ills., index. Wilhelm Engelmann, Leipzig, 1910. 10½ x 7½ each.

For more than ten years Professor Engler, Director of the Berlin Botanical Garden, has been devoting a large share of the energy of his institution to the collection and description of the African flora. A number of botanical expeditions have been sent to the German possessions and to other portions of Africa, and the earlier collections and observations of explorers have been made use of in the furtherance of this ambitious scientific campaign. The assembled results of Engler's work are now being published in a series of five volumes entitled "Die Pflanzenwelt Afrikas," the first of which, in two parts, deals with the vegetation of Africa, and is therefore of wider interest than the succeeding volumes devoted to the classification of the flora.

Engler has confessedly devoted the most attention to the German colonies, and has given us an excellent picture of the character and distribution of their vegetation. For the remainder of Africa he has given a treatment which is sometimes limited by the lack of knowledge, sometimes by the uselessness of duplicating very thoroughgoing accounts of vegetation which are already published. Such readily accessible portions of the continent as the Mediterranean coast and the Cape have been thoroughly explored by botanists and are well known both as respects their flora and their vegetation, while large areas of the interior are practically a virgin field. In spite of the unevenness which is thus given to Engler's treatment it is well for scientific purposes that he has undertaken the study of the entire continent, particularly for the solution of problems in the history and movements of the flora, to say nothing of the fact that we have thereby secured the first account of the vegetation of the whole of Africa, and an account which—as respects most of the continent—is as detailed as present knowledge will permit.

For purposes of description Engler has divided Africa into five vegetational areas: the arid northern region of the Mediterranean coast and the Sahara, in which the flora resembles that of southern Europe; tropical East Africa, a region extending from Somaliland to the Cape; a small area in the southwestern part of the Cape which is distinguished by winter rains and a markedly peculiar flora; tropical and sub-tropical West Africa, a region comprising both desert and rain-forest; and the islands off the northwest coast. The most widespread types of vegetation south of the Sahara are sparsely wooded grassland, or savanna, and the still more sparsely wooded bush-steppe, which is practically desert, although possessing a far richer vegetation than the Sahara. The regions covered by heavy rain-forest are limited on the east coast to the vicinity of Zanzibar and on the west coast to the Congo valley and narrow belts on the Guinea Coast. Apparently these forests seldom attain the density and wealth of forms which characterize the forests of the most rainy portions of Mexico and South America. The vertical distribution of vegetation has been studied chiefly on Ruwenzori and Kilimanjaro and in the mountains of Kamerun, all of which exhibit unusual types of vegetation, and possess a flora which has close affinities with that of Europe.

Engler has not only described the physiognomy of African vegetation and given lists of the common and characteristic plants and a wealth of detail regarding their gross anatomy, but he has done more than this in continually relating the changes in character of the vegetation to the changes in physical features, in soils, and in climate. His climatological data is chiefly drawn from Hann and Fraunberger, and are designed, naturally, to give only a very incomplete conception of the distribution of climatic conditions in Africa. It is possible, however, even with the incomplete knowledge of the present time, to discover a general correlation between the most distinct types of vegetation and the most marked climatic regions, some features of which correlation find a close parallel in the southern portion of North America.

The two volumes are profusely illustrated, partly with characteristic landscapes and views of the vegetation, but chiefly with cuts showing the foliage and flowers of individual species of plants. Detailed maps of the vegetation of the four German colonies are particularly well executed.

Professor Engler has been actuated in this work not only by its scientific importance, but by a realization of the practical value which natural vegetation possesses as an index of the agricultural possibilities of the various portions of Africa. We have every admiration for the manner in which the German nation is bringing its scientific workers into cooperation in aiding the early development of its colonial possessions. FORREST SHREVE.

Tripoli and Young Italy. By Charles Lapworth in collaboration with Miss Helen Zimmern. 347 pp. Map, ills. Stephen, Swift & Co., Ltd., London, 1912. 10s. 6d. 9 x 6.

This book attempts to define the "new Italy" recently seized by that kingdom in Africa. The author presents as comprehensively as possible the case for Italy. A review of the doings of the Turkish Government in Tripoli opens the discussion, and the indictment of Turkey is severe. So logical and forcible is the argument that the reader may be convinced that Italy's act was wholly justified. But the author perhaps weakens his case in the following chapter, which expounds the thesis that "Tripoli was a vital political necessity to Italy." The author gives a good account of the main features of Tripoli's history, estimates fairly her commercial value and is optimistic concerning her future development. The remainder of the book is an appreciation of Italy and is presented under the divisions of political, economic, intellectual and nationalist Italy. It closes with a discussion of Italy's place in European politics following her rise in prestige since the successful outcome of her Tripolitan experience. The book is entertaining and the subject-matter is carefully arranged.

ROBERT M. BROWN.

Tripoli the Mysterious. By Mabel Loomis Todd. xv and 214 pp. Ills., index. Small, Maynard & Co., Boston, 1912. $2. 8½ x 5½.

Two visits to Tripoli to view the eclipses of 1900 and 1905 gave Mrs. Todd an opportunity to get some vivid impressions concerning this country of the north of Africa. The picture which she presents is as she says "an incomplete one . . . though drawn with a loving and appreciative hand." We get slight glimpses of the white city of Tripoli, of a few of its buildings, relics and gardens, and especially of the harems, weddings, markets and funerals. However, Mrs. Todd shows herself more the astronomer than the tourist, and for this reason, probably, the chapters on the eclipses, with the fascinating city of Tripoli as a background, are especially interesting parts of the book.

ROBERT M. BROWN.

ASIA

Report on the Control of the Aborigines in Formosa. 45 pp. Maps, ills. Bureau of Aboriginal Affairs, Taihoku, Formosa, 1911. 9 x 6.

Two comparisons bearing upon this volume cannot fail of awakening surprise. The title suggests the classic remark passed between pot and kettle, for this is the report of a Japanese Bureau of Aboriginal Affairs, and it is within the memory of men yet alive that Japan itself was a land of aborigines. But this bureau in Formosa is intelligent and active, it is grappling with the problem of civilizing the wild. The other comparison which surprises is to attempt to adjust this work to Dr. Mackay's "From Far Formosa." There is nothing to adjust, the scene of this work is in a part of Formosa of which Mackay had no knowledge, yet his work was published but fifteen years earlier. The text of the report is most succinct, it needs but 45 pages. The greater value of the volume lies in the illustrations, which are generously supplied; between page 2 and page 3 there are no less than twenty-one full-pages of process illustrations from photographs, more than a hundred in the volume, and all valuable illustrations for the ethnographer. WILLIAM CHURCHILL.

Through India and Burmah with Pen and Brush. By A. Hugh Fisher. xii and 358 pp. Index. T. Werner Laurie, London., 1912. 15s. 9 x 6.

Mr. Fisher gives us a vivid and minute description of his journey through India and Burmah where he visited the principal cities and places of historical interest. Sent to the East as artist for the Visual Instruction Committee of the Colonial Office, England, the author had especial opportunity to meet the prominent native rulers and officials, and to obtain an insight into the lives, customs and political views of the people. The book is profusely illustrated with sketches made by the author, and eight are reproduced in color from the original paintings. W. J. BURROUGHS.

Forschungsreise in den Südöstlichen Molukken (Aru- und Kei- Inseln). Im Auftrage der Senckenbergischen Naturforschenden Gesellschaft ausgeführt von Dr. Hugo Merton. xii and 208 pp. Maps, ills. Senckenbergische Naturforschende Gesellschaft, Frankfurt a.M., 1910. Mks. 45. 12 x 9½.

This handsomely executed volume is pleasing evidence that the great Senckenberg Society of Frankfurt has returned to the field of inquiry in which some dozen or more years ago it ranked among the highest. In 1896 it began the publication of Kuekenthal's zoological survey of Borneo and the Moluccas, which occupied four years in publication and which was enriched by a score of monographs by eminent investigators upon material tributary to the main theme. In returning after a decade to Indonesia the society has done wisely in selecting for publication the report of Dr. Hugo Merton upon the faunal survey of these outlying Moluccas, which, in company with Dr. Jean Roux, of Basel, occupied him from October, 1907, to August, 1908. His prime object lay along the lines of animal geography, for Aru (the Aroe of Dutch charts and thence carried in phonetic ignorance to many of our maps) and Kei are almost at the limiting point of the East Indian zoological province, and it was a matter of no little moment to determine to what extent it exhibited traces of mingling with the Papuan sub-province and the larger Australasian province. But so competent an observer could never be content to leave the cartography of Aru in the shabby confusion in which he found it. The sight of Merton's chart of this principal group of the Arafura Sea brings into fresh recollection experiences a quarter century old, both here and in Tenimber, where the channel which divides Timor-laut was still in such doubt that it had not yet been charted. Dr. Merton has done wisely in presenting as a base the Aru chart, as it was when he began his studies and in superimposing thereupon, on a perfectly registered tissue sheet, the results of his reconnaissance. Thus, at a glance we are able to see to what an extent geography is indebted to his skill in a field of research which was but incidental to the purpose of his visit. It now remains for the Dutch Admiralty to bring its charts up to this really critical date. I am dependent now upon memory, but in recollection of the three great estuaries which split the principal island, I am quite convinced that Dr. Merton's careful detail of the marsh and river systems of Sungi Maikoor, Sungi Barkai and Sungi Manumbai are undoubtedly accurate. WILLIAM CHURCHILL.

AUSTRALASIA AND OCEANIA

Die Sunda-Expedition des Vereins für Geographie und Statistik zu Frankfurt am Main. Von Dr. Johannes Elbert. Festschrift zur Feier des 75 jährigen Bestehens des Vereins. Band 1. xxv and 274 pp. Maps, ills. Hermann Minjon, Frankfurt am Main, 1911. Mks. 40. 12 x 9.

This Indonesian volume is a worthy offering in celebration of the third quarter century of the fourth in age of the world's great geographical societies, the next to the oldest in Germany. In this first volume Dr. Elbert deals with Lombok, Muna, Buton and the southeastern peninsula of Celebes. The last of these fields of survey comes with particular interest as supplementing the brilliant record which for the rest of Celebes we owe to the cousins Sarasin. Those able explorers were obliged to leave the field before they had ventured upon this peninsula; therefore we are grateful that the omission has been so promptly and so carefully supplied. The prime object in Dr. Elbert's work was vulcanography and geoplastics as dependent thereupon. But his observation was by no means restricted. We note the intelligent curiosity with which he has studied the cloud masses capping the higher mountains and feel sure that meteorologists will find much satisfaction in his explanation of the atmospheric physics of earth-generated air currents directed upward by mountain slopes. In ethnography he is similarly alert in the study of all the material which it was within his power to examine. In linguistics he has provided a small supply of material from Muna and promises later a vocabulary of 700 words. In the small material which he offers here we find the suggestion of a most important matter. We now regard the intermingling of the Malayan (more properly Indonesian) languages and the Polynesian, amounting at the outside to less than 150 vocables, as due to a persistence of early Polynesian ancestors in retired spots when the oncoming of the Indonesian parents was expelling the former inhabitants. In this Muna material we note that forms identifiable as Polynesian are far closer to the Proto-Samoan than the cognate forms in Malay or Buton. Muna is a small outlier of the southeastern Celebes peninsula; the corresponding outlier of the southwestern peninsula is Salayer, also exhibiting close similarities with the Proto-Samoan speech. In the next work of my series upon Polynesia I shall point out the fact that the honorific title of our American island of Tutuila in Samoa is "Le motu o Salaia," the island of Salaia, a term incomprehensible in Samoan, unrecognizable elsewhere save at this distant tip of Celebes. WILLIAM CHURCHILL.

Wissenschaftliche Ergebnisse einer amtlichen Forschungsreise nach dem Bismarck-Archipel im Jahre 1908. II: Beiträge zur Völker- und Sprachenkunde von Deutsch-Neuguinea. Von Dr. Georg Friederici. vi and 324 pp. Map, ills. *Mitt. aus den Deutschen Schutzgebieten*, Ergänzungsheft Nr. 5. Ernst S. Mittler & Sohn, Berlin, 1912.

This is one of the books rare in the experience of those whose lives are passed in the society of printed pages, one that a writer would feel proud to have written. It is not that the training of the German ethnologist is superior to the random methods and rarely inspired blundering of English and American practitioners of that science of the byways of the wild; it is not that Captain Friederici is an accurate observer, for there have been many accurate German explorers; it is his sympathy with the simple, his breadth of knowledge of the world and the men thereof, which give this volume a charm which enriches its great value.

The region studied is the western tip of Neupommern, over against New Guinea, especially the Barriai people. This is breaking new ground. Ages ago stands the brief discovery record of Dampier; there has been no second. Neither trader nor missionary has sought out this folk; when Friederici visited them they had undergone almost no contamination by the trickle of strange custom and foreign goods at second or third or later hand, each hand grasping and clutching and passing little onward. We feel a sense of security in following out this record. For one thing it is so complete; no least detail is omitted; there is statement of each most intimate activity of the life of these savages; it is all set down, and the sum is not diminished by omission of any particulars which the subjects of the inquiry see no reason to hide from sight or to omit from speech. But of far more importance is it that the recorder does not pretend to understand all the things which he has observed; he does not assume to explain, it is enough for him to record. This is quite as it should be. The savage does not think as we do, the categories of his reasoning are scarcely associable with our logic; the longer the student has to do with such folk the less inclined he is to venture upon explanation of thought and conduct.

To cartography Captain Friederici has given accurate determinations of coast for considerable distances along the unknown north shore of Neupommern, and at the western limit of his acitivity he has filled in a large mass of detail for the interior of the island. His linguistic results are admirable. He gives at very satisfactory length a vocabulary of the Barriai and his grammatical discussion thereof is excellent of its type, although I must feel that the speech usage of Melanesians and Polynesians will yield more satisfactory results under a different and simpler treatment. This major vocabulary is supplemented by brief records of several languages with which he had less satisfactory opportunity of becoming acquainted.

The breadth of his view is excellently illustrated in the ethnographic employment of vocabulary material upon certain selected themes. He has devoted much care to the examination of the canoe and of the weapons of offence, the spear, the bow and arrow, the sling. In each case he carries the record from the western limit of Indonesia to the eastern ultimate of Polynesia, and the speech record is used to trace the path of migration. I may properly note that in the Barriai vocabulary I have been able to identify material of the so-called Malayo-Polynesian speech. It lies wholly within that small group of common vocables which I have sought to establish as Polynesian left behind by the brown race on its wanderings. Its occurrence in the Barriai, midway between Moánus and the similarly affected languages of southeast New Guinea, shows clearly that Dampier's Strait was an open highway to the Polynesian fleet.

WILLIAM CHURCHILL.

ECONOMIC GEOGRAPHY

Checking the Waste. A Study in Conservation. By Mary Huston Gregory. 318 pp. Ills. Bobbs–Merrill Co., Indianapolis, 1911. $1.25, 7½ x 5.

The author has gathered a great deal of material and tells of it attractively. There is no chapter without good matter. We destroy more coal in mining it than we get out, and our supply will be gone in 139 years. Our lumber will last, in commercial quantities, but 25 years. Our locomotives need three times as much coal to do a given task as English ones. Oil drillers are burning gas to get rid of it, in one case in Indiana fourteen wells burning for six months within a space of a few acres. Worst of all, 500,000 American workers are annually killed or crippled at their work by preventable accidents.

But when the author adds that we are wasting 30,000,000 horse power in unused waterfalls she is using waste in another sense. The power is still there for the next generation. She has no protest for the water powers and other resources that are being stolen from the people by the few, that another generation may use only by permission of "owners" who have no equitable title. Nor can the statements of the book be all accepted. Kansas has not had its rainfall increased by tree and crop planting (p. 44). Dry farming is not merely deep plowing and packing under a pulverized surface (p. 38). The using, even to exhaustion, of resources like iron, lead, silver and petroleum, cannot be called waste (p. 300). Hilltops are not always the poorest land on the farm (p. 33). Nor is the land of valleys enriched by the wash from deforested hillsides (p. 32). It is not true that you can get twenty bushels of wheat from an acre of land with the same labor as twelve (p. 14). It is extravagant to say that hundreds of millions of arid acres have been or may be irrigated (p. 107). Such statements are too frequent. MARK JEFFERSON.

OTHER BOOKS RECEIVED

NORTH AMERICA

Report of the Dominion of Canada Government Expedition to the Arctic Islands and Hudson Strait on Board the D.G.S. *Arctic,* 1908-9. By Captain J. E. Bernier. xxix and 529 pp. Maps, ills., index. Govt. Printing Bureau, Ottawa, 1910. 9½ x 6½. [The cruise of the *Arctic* and the taking possession for Canada of the Arctic archipelago north of the American mainland.]

The Hoosac Valley. Its Legends and Its History. By Grace Greylock Niles. xxv and 584 pp. Maps, ills., index. G. P. Putnam's Sons, New York, 1912. $3.50. 8½ x 6. [The story of beginnings in Hoosac and Saratoga, and their relation to U. S. history. Told in a pleasant style.]

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NEW MAPS

Edited by the Assistant Editor

Maps issued by United States Government Bureaus

U. S. Geological Survey

Topographic Sheets
(Including Combined and Special Topographic Maps)

Arizona. (a) Flagstaff Quadrangle. Surveyed in 1907 and 1908. 1:125,000. 35°30′ - 35°0′ N.; 112°0′ - 111°30′ W. Contour interval 100 ft. Edition of June 1912.

(b) Roosevelt Quad. Surveyed in 1905-1907. 1:125,000. 34°0′ - 33°30′ N.; 111°30′ - 111°0′ W. Interval 100 ft. Edit. of Aug. 1912.

Arkansas. Hot Springs and Vicinity. Surveyed in 1896, revised in 1910-11. 1:62,500. 34°37′ 57″ - 34°22′ 57″ N.; 93°10′ 47″ - 92°55′ 47″ W. Interval 20 ft. Edit. of Aug. 1912.

[Comparison with the edition of April, 1898, brings out well the improvement in methods of topographic mapping since that time.]

California. (a) Buena Vista Lake Quad. Surveyed in 1907-1908-1910. 1:125,000. 35°30′ - 35°0′ N.; 119°30′ - 119°0′ W. Interval 100 ft. Edit. of Aug. 1912.

(b) Coalinga Quad. Surveyed in 1908 and 1910. 1:125,000. 36°30′ - 36°0′ N.; 120°30′ - 120°0′ W. Interval 100 ft. Edit. of July 1912.

(c) Mariposa Quad. Surveyed in 1909-1910. 1:125,000. 37°30′ - 37°0′ N.; 120°0′ - 119°30′ W. Interval 100 ft. Edit. of July 1912.

(d) Nord Quad. Surveyed in 1910. 1:31,680. 39°52′ 30″ - 39°45′ 0″ N.; 122°0′ 0″ - 121°52′ 30″ W. Interval 5 ft. Edit. of Aug. 1912.

[One of the two-inches-to-the-mile sheets of the Sacramento Valley.]

Illinois. Canton Quad. Surveyed in 1910. 1:62,500. 40°45′ - 40°30′ N.; 90°15′ - 90°0′ W. Interval 20 ft. Edit. of Aug. 1912.

[Wooded areas shown in green.]

Maryland-Pennsylvania. Hagerstown Quad. Surveyed in 1908-1910. 1:62,500. 39°45′ - 39°30′ N.; 77°45′ - 77°30′ W. Interval 20 ft. Edit. of June 1912.

[Wooded areas shown in green.]

Maryland-Virginia. Point Lookout Quad. Surveyed in 1890; culture revised in 1900. 1:62,500. 38°15′ - 38°0′ N.; 76°30′ - 76°15′ W. Interval 20 ft. Edit. of Sept. 1912.

Montana. Zurich Quad. Surveyed in 1902 and 1909. 1:125,000. 49°0′ - 48°30′ N.; 109°30′ - 109°0′ W. Interval 20 ft. Edit. of Aug. 1912.

[Southern half reduced from Chinook and Yantic sheets, 1:62,500.]

New Mexico. (a) Magdalena District. Surveyed in 1910. 1:12,000. 34°7′0″ - 34°3′ 15″ N.; 107°13′ 0″ - 107°10′ 45″ W. Interval 25 ft. Edit. of Sept. 1912.

(b) Mogollon Quad. Surveyed in 1909-1910. 1:125,000. 33°30′ - 33°0′ N.; 109°0′ - 108°30′ W. Interval 100 ft. Edit. of June 1912.

Ohio. (a) Carrollton Quad. Surveyed in 1910. 1:62,500. 40°45′ - 40°30′ N.; 81°15′ - 81°0′ W, Interval 20 ft. Edit. of June 1912.

(b) Columbus Quad. Surveyed in 1899, 1901 and 1902. 1:125,000. 40°15′ - 39°45′ N.; 83°15′ - 82°45′ W. Interval 20 ft. Edit. of Aug. 1912.

[Reduced from Dublin, East Columbus, West Columbus and Westerville sheets, 1:62,500.]

(c) Oak Hill Quad. Surveyed in 1910. 1:62,500. 39°0′ - 38°45′ N.; 82°45′ - 82°30′ W. Interval 20 ft. Edit. of June 1912.

[On sheets (a) and (c) wooded areas in green.]

Pennsylvania. McCalls Ferry Quad. Surveyed in 1910. 1:62,500. 40°0′ - 39°45′ N.; 76°30′ - 76°15′ W. Interval 20 ft. Edit. of June 1912.

[Wooded areas in green.]

Washington. Moses Lake Quad. Surveyed in 1910. 1:62,500. 47°15′ - 47°0′ N.; 119°30′ - 119°15′ W. Interval 25 ft. Edit. of Aug. 1912.

West Virginia. (a) Bald Knob Quad. Surveyed in 1910. 1:62,500. 38°0′ - 37°45′ N.; 81°45′ - 81°30′ W. Interval 50 ft. Edit. of July 1912.

(b) Holden Quad. Surveyed in 1910. 1:62,500. 38°0′ - 37°45′ N.; 82°15′ - 82°0′ W. Interval 50 ft. Edit. of Sept. 1912.

(c) Portions of Matewan and Williamson Quads. 1:62,500. 37°45′ - 37°31′30″ N.; 82°20′ - 82°0′ W. Interval 50 ft. Edit. of Sept. 1912.

[On all three sheets wooded areas in green. Kentucky portion of map (c) left blank.]

UNITED STATES—CANADA. North America. 1:1,000,000. [Sheet] North K 19: Boston. 44°-40° N.; 72°-66° W. 14 colors. U. S. Geological Survey, Washington, Feb. [Oct.] 1912. 40 cents.

[For detailed comment on this first sheet completed of the U. S. portion of the International Map of the World (preliminary proof listed in *Bull.* under the same entry, Vol. 44, No. 5, 1912, p. 399), see the Nov. *Bull.*, pp. 842-844.]

NORTH AMERICA

CANADA

CANADA. Grenzerweiterungen der Provinzen Quebec, Ontario, und Manitoba in Kanada. 1:25,000,000. 65°-40° N.; 103°-55° W. Accompanies note on "Die erweiterten Provinzen von Kanada" by H. Wichmann, *Pet. Mitt.*, Vol. 58, I, June, 1912, p. 319.

[Shows changes in boundaries of Manitoba, Ontario and Quebec according to the law passed on March 27 and 28, 1912, which gave Manitoba access to Hudson Bay and apportioned the respective parts of Keewatin and Ungava to Ontario and Quebec.]

UNITED -STATES

ALASKA. (a) Gletscher des unteren Kupferflusses (Alaska). Von Prof. Lawrence Martin. 1:65,000. [60° 50′ - 60° 38′ N.; 144° 52′ - 144° 27′ W.] Oriented N. 21° E. 3 colors. With inset: Das Gebiet des Kupferflusses. Nach der "Karte von Alaska" in "Peterm. Mitteilungen," 1907, Tafel 1. 1:5,000,000. [64°-59° N.; 149°-139° W.] 3 colors.

(b) Tiefenkarte von Port Wells (Prinz-William-Sund). 1:126,720. [61° N. and 148° 10′ W.]

Accompany, as Taf. 9 and on p. 148, respectively, "Gletscheruntersuchungen längs der Küste von Alaska" by L. Martin, *Pet. Mitt.*, Vol. 58, II, Aug. and Sept., 1912, pp. 78-81 and pp. 147-149.

ILLINOIS. Provisional Geologic Map of Illinois. 1:500,000. 12 colors. State Geological Survey [Urbana, Ill.], 1912.

[Fundamental geological map of the state. Geology superimposed on base map of Illinois listed in *Bull.*, Vol. 44, No. 5, 1912, p. 399. Columnar and cross sections added; also outline of the geological history of Illinois.]

MEXICO

MEXICO. [Five state maps, 1:1,000,000, entitled:] (1) Map of the State of Sinaloa, Mexico. Compiled by H. A. Horsfall, New York City. 1912. 27⅓°-21⅔° N.; 110° - 104° W. 4 colors. (2) — Durango —. 1912. 27⅓° - 21⅔° N.; 107½°-102½° W. 6 colors. (3) — Coahuila —. 1911. 30°-24½° N.; 104°-99° W. 2 colors. (4) — Chihuahua —. 1911. 32¼°-24½° N.; 109½°-102½° W. 5 colors. (5) — Sonora —. (Advance copy, 1913). 33°-25⅓° N.; 115°-108⅓° W. 5 colors. Published by H. A. Horsfall, Mining Engineer, 69 Wall St., New York, N. Y.

[Maps, valuable because of their large scale, showing mainly the locational element. Relief is roughly indicated by hachuring. The maps are reproduced directly from the original drawings on tracing cloth.]

CENTRAL AMERICA AND WEST INDIES

CUBA. Map of Cuba prepared in the War College Division, General Staff, War Department, Washington, 1911. Based on Military Reconnaissances by the United States Army during the First and Second occupation of Cuba, 1898-1902 and 1906-1909. [1:600,000.] 23°30′ - 19°30′ N.; 85° - 74° W. 2 colors. In two sheets. War Department, Washington, 1911.

[Important map on relatively large scale, in execution similar to the U. S. Geological Survey maps. Distinction made between four kinds of roads; relief in brown contours, interval 50 ft.]

JAMAICA. A part of Jamaica showing the Relation of Earthquake Damage (14th Jan. 1907) to Erosion of Land. 1:750,000. [18°30′ - 17°45′ N.; 77°20′ - 76°0′ W.]. Accompanies, on p. 301, "On the Cause of the Jamaica Earthquake of January 14, 1907" by V. Cornish, *Geogr. Journ.*, Vol. 40, No. 3, 1912, pp. 299-303.

[Relief in contours; interval 1,000 ft.]

SOUTH AMERICA

CHILE. Karte des südwestlichen Teiles der Provinz Coquimbo in Chile. Aufgenommen von der Oficina de geografia i [*sic*] minas unter Leitung von José del C. Fuenzalida. 1:200,000. 30°30′ - 31°30′ S.; 71°46′ - 70°50′ W. 7 colors. Taf. 56, "Zur geographischen und geologischen Landesaufnahme der Republik Chile" by J. del C. Fuenzalida and H. Polakowsky, *Pet. Mitt.*, Vol. 58, I, June, 1912, pp. 312-316.

[Valuable large-scale map which forms part of a map entitled "Carta geografica y minera de la provincia de Coquimbo" engraved and printed by Justus Perthes for the Chilean Oficina de Geografía y Minas. Reliefs is shown in pale and unexpressive shading and in hypsometric coloring in six tints. Distinction is made between railroads in existence and under construction, roads for wheeled traffic and bridle paths, and there are separate symbols for seven kinds of mines.

Of the greater part of the region shown there has been no adequate large-scale map heretofore. Similar maps of the province of Aconcagua and parts of the provinces of Santiago, Valparaiso and Atacama have already been published by this bureau; maps of the provinces of Arauco, Concepcion and Valdivia are in preparation.]

AFRICA

Bechuanaland-German Southwest Africa, etc. Die Kalahari mit ihren Völkern und Handelsrouten. Entworfen von Dr. Rudolf Pöch. 1:2,000,000. 17° - 31° S.; 16½° - 29¼° E. 1 color. Taf. 2, "Ethnographische und geographische Ergebnisse meiner Kalaharireisen" by R. Pöch, *Pet. Mitt.*, Vol. 58, II, July, 1912, pp. 15-20.

[Important map embodying the results of all previous exploration. Special features are: the delimitation of the Kalahari, the dune region of its southwestern part being specially represented; the careful distinction between dry river beds and perennial rivers, and between constant and transitory springs or "pans"; the designation of the habitat of native tribes; the representation of trade routes through arid districts, and the careful orthography of all geographic names. In addition there are symbols for settlements or villages, mission stations, abandoned places, mines, farms, military and police stations, railroads, territorial and negro reservation boundaries, etc. A list of the sources used in compiling the map is given on p. 18 of the text.]

Morocco. (a) Die Hochebenen westlich des Uad Beth [*sic*]. Entworfen und gezeichnet von Prof. Dr. P. Schnell (P. Schnell: Zur Kartographie von Nordmarokko: Blatt II). 1:200,000. 34°23′ - 33°41′ N.; 7°2′ - 5°58′ W. 4 colors.

(b) Übersichtskarte der Peilungen zu Blatt 2: Die Hochebenen westlich des Uad Beht und Blatt 3: El Gharb. (Zur Kartographie Nordmarokkos). Von Prof. Dr. Paul Schnell. 1:300,000. [35° - 34° N.; 6°49′ - 5°7′ W.]

Taf. 8, "Zur Kartographie Nordmarokkos: II" and Taf. 21, "Zur Kartographie Nordmarokkos: III" by P. Schnell, *Pet. Mitt.*, Vol. 58, II, 1912, Aug., pp. 75-77 and Sept., pp. 137-142, respectively.

[Continuation of series of maps listed under "Morocco" (first entry), *Bull.*, Vol. 44, No. 2, 1912, p. 157, the eastern limiting meridians of which should there be corrected to read 4°58′ W. and 4°57′ W., respectively, instead of 40°58′ and 40°57′.]

Nigeria. Northern and Southern Nigeria to illustrate the paper by C. L. Temple, C.M.G. 1:5,000,000. 14°30′ - 4°0′ N.; 2°0′ - 15°30′ E. 1 color. Accompanies "Northern Nigeria" by C. L. Temple, *Geogr. Journ.*, Vol. 40, No. 2, 1912, pp. 149-168.

[Outline map showing drainage, railroad and telegraph lines and the author's route.]

ASIA

Arabia. B. Raunkiaers Reiseweg im nordöstlichen Arabien. 1:7,500,000. 31° - 24° N.; 44° - 50½° E. Accompanies, on p. 85, "Die Expedition der kgl. Dänischen Geographischen Gesellschaft nach Arabien" by B. Raunkiaer, *Pet. Mit.*, Vol. 58, II, Aug., 1912, pp. 84-85.

[Route of expedition reported in Sept. *Bull.* (Vol. 44, No. 9, 1912), pp. 657-660.]

India. Panjkora Kohistan. Sketch Map to Illustrate the Route of Lieut. Colonel S. H. Godfrey, C.I.E., 1908. 1:500,000. 35°36′ - 35°6′ N.; 71°45′ - 72°27′ E. With inset: 1:3,000,000. 36°6′ - 34°0′ N.; 71° - 73° E. Accompanies, on p. 47, "A Summer Exploration in the Panjkora Kohistan" by S. H. Godfrey, *Geogr. Journ.*, Vol. 40, No. 1, 1912, pp. 45-57.

[Route, hitherto untrodden by a European, lay up the Panjkora River, which occupies the second parallel valley to the west of the Indus at the bend where it breaks through the Himalayas. Relief in wash.]

India. Northern Sikkim. To illustrate the paper by Dr. A. M. Kellas. 1:300,000. 28°8′ - 27°33′ N.; 88° - 89° E. 2 colors. With inset showing location of main map. Accompanies "The Mountains of Northern Sikkim and Garhwal" by A. M. Kellas, *Geogr. Journ.*, Vol. 40, No. 3, 1912, pp. 241-263.

[Relief in brown wash, glaciers in blue.]

Japan. (a) Übersichtskarte von West-Hokkaido. Nach I. Friedländer, Über einige Japanische Vulkane. Mitteilungen der Deutschen Gesellschaft für Natur- und Völkerkunde Ostasiens (XII, 2, 1910). Auf Grundlage der topographischen Karte des Imperial Geological Survey of Japan. 1:762,000. 43°24′ - 41°18′ N.; 139°12′ - 142°2′ E. 2 colors.

(b) Kartenskizze des Usu. Nach der Karte von F. Omori und Beobachtungen von I. Friedlaender. 1:18,150. [42°36′ N. and 140°48′ E.]. 3 colors.

Taf. 51 and 52, "Über den Usu in Hokkaido und über einige andere Vulkane mit Quellkuppenbildung" by I. Friedlaender, *Pet. Mitt.*, Vol. 58, I, June, 1912, pp. 309-312.

[Map (a) shows location of recent volcanoes and hypothetical faults. Map (b) shows explosion craters, fumaroles and springs; relief in contours and shading. Map (b) is based on map listed under "Japan (c)" in *Bull.*, Vol. 43, 1911, pp. 797-798.]

Philippine Islands. Geologic Reconnaissance Map of Mindanao. Geology by Warren D. Smith. [1:1,000,000]. 10°0′ - 5°15′ N.; 121°35′ - 126°45′ E. 4 colors. Should accompany (issued too late for insertion) "Geological Reconnaissance of Mindanao and Sulu: III General and Economic Geology" by W. D. Smith, *Philippine Journ. of Science,* Section A, Vol. 6, No. 5, 1911, pp. 359-395.

[Important map. Differentiates between (1) alluvial, (2) Tertiary sedimentary, (3) extrusive and (4) metamorphic rocks.]

Turkey in Asia. [Three maps entitled:] Reisen in Kurdistan 1910. Nach den eigenen Photographien und Routenaufnahmen konstruiert und gezeichnet von Dr. Heinrich Freiherrn v. Handel-Mazzetti. 1:400,000. 2 colors.

I. Von Urfa über Kjachta nach Malatja und Is Oghlu mit Abstechern auf den Nemrud- und Ak-Dagh. [38°30′ - 37°20′ N.; 38°9′ - 39°0′ E.]

II. Von Arghana über Diarbekir, Mejafarkin und das Sassun nach Sert mit Besteigung des Meleto Dagh. 38°33′ - 37°30′ N.; 39°55′ - 42°5′ E. With inset: Der Meleto Dagh. 1:125,000. [38°23′ N. and 41°33′ E.]

III. Die Chaldäerdörfer zwischen Dschesiret-ibm-Omar und Simel. Nach Angaben von Guriel Gorgis Homme aus Schios. 37°22′ - 36°43′ N.; 42°10′ - 43°0′ E.

With inset showing location of maps I-III: Übersicht der Reisewege der Mesopotamien-Expedition des Naturwissenschaftlichen Orientvereins in Wien 1910. 1:3,700,000. 39° - 32½° N.; 34½° - 45½° E. 3 colors.

Taf. 17, "Zur Geographie von Kurdistan" by H. Freiherrn v. Handel-Mazzetti, *Pet. Mitt.*, Vol. 58, II, Sept., 1912, pp. 133-137. [Valuable route surveys.]

Turkey in Asia. Lower Mesopotamia. From the latest surveys of Sir William Willcocks, K.C.M.G. 1:3,000,000. 36°0′ - 29°45′ N.; 39°35′ - 49°10′ E. 1 color. With inset: [The Near East showing railroads finished and under construction. 1:18,000,000. 44°- 30° N.; 25° - 56° E. 1 color.]. Accompanies "The Garden of Eden and its Restoration" by W. Willcocks, *Geogr. Journ.*, Vol. 40, No. 2, 1912, pp. 129-148.

[Shows proposed works and systems of irrigation; also ancient towns and cities, canals and rivers.]

Turkey in Asia. Sketch Map to Show Approximately Railways in Asiatic Turkey. 1:7,500,000. 43° - 28° N.; 24° - 54° E. 6 colors. (Geogr. Section of the Gen. Staff, London), 1911.

[Distinguishes by colors between different railroad systems and by symbols between different gages.]

Turkey in Asia. The Troad. After Kiepert & Philippson with corrections by Walter Leaf. 1:600,000. 40°31′ - 39°18′ N.; 25°52′ - 30°14′ E. 3 colors. With inset: [Environs of Mt. Ida]. 1:300,000. 39°55′ - 39°30′ N.; 26°46′ - 27°9′ E. 3 colors. Accompanies "Notes on the Troad" by W. Leaf, *Geogr. Journ.*, Vol. 40, No. 1, 1912, pp. 25-45.

[Drainage in blue, relief in brown shading, ancient names in red.]

AUSTRALASIA AND OCEANIA

Kaiser Wilhelms Land. Reise von Finschhafen nach dem Markhamfluss (Kaiser-Wilhelms-Land). Nach dem Routentagebuch von Missionar G. Pilhofer konstruiert von C. Barich. 1:400,000. 5°52′ - 7°4′ S.; 146°15′ - 148°2′ E. 3 colors. Taf. 22, "Eine Reise von Finschhafen nach dem Markhamfluss (Deutsch-Neuguinea)" by G. Pilhofer, *Pet. Mitt.,* Vol. 58, II, Sept., 1912, pp. 143-147.

[Important map embodying results of new exploration. Cf. also map listed under same entry, *Bull.,* Vol. 44, No. 1, 1912, p. 79, the limiting parallels of which, however, should there be corrected to read 5°52′ - 6°46′ S.]

New Zealand. (a) Taupo Volcanic Zone. 1:1,250,000. 37°30′ - 39°18′ S.; 175°36′ - 177°12′ E. With inset showing trend of Taupo volcanic zone.

(b) Topography of the Tarawera Volcanic Rift soon after the eruption of 1886. 1:80,000. [38°16′ S. and 176°30′ E.]

(c) Tuhua or Mayor Island, Bay of Plenty. Surveyed by E. C. Goldsmith, 1884. [37°20′ S. and 176°15′ E.]

Accompany, on pp. 11, 13 and 22, "Some New Zealand Volcanoes" by J. M. Bell, *Geogr. Journ.,* Vol. 40, No. 1, 1912, pp. 8-25.

EUROPE

British Isles, Etc. (a) [Three maps of the British Isles, 1:7,500,000, showing the distribution of:] (1) Flat Celts; (2) Beakers; (3) Minerals.

(b) [Two maps of west-central Europe, 1:15,000,000 (61° - 47° N.; 11° W. - 20° E.), entitled:] (1) The Principal Settlement Areas of the Beaker People in Britain and on the Continent; (2) The Distribution of Gold Lunulae of the Early Bronze Age.

(c) Map of the Fen District to Show that Flat Celts and Beakers are Most Frequent Where the "Shore-Line" is of Bare Chalk. 1:750,000. [53°10′ - 51°50′ N.; 0°30′ W. - 0°45′ E.]

Accompany, as Figs. 2, 4, 9, 6, 8 and 5, "The Distribution of Early Bronze Age Settlements in Britain" (first part) by O. G. S. Crawford, *Geogr. Journ.,* Vol. 40, No. 2, 1912, pp. 184-203.

Germany. Tiefenkarte des Goplo-Sees (Preussischer Anteil). Aufgenommen von Dr. Hermann Schütze. 1:50,000. [52°43′ - 52°32′ N.; 18°17′ - 18°25′ E.] 9 colors. Taf. 1, "Der Goplosee" by H. Schütze, *Pet. Mitt.,* Vol. 58, II, July, 1912, pp. 11-15.

[Similar in treatment to maps listed under "Germany (b)" (first entry), *Bull.,* Vol. 44, No. 8, 1912, p. 639.]

Scotland. Map of the Glacieluvial Kame near Polmont. 1:25,000. [56° N. and 3°43′ W.]. Accompanies, on p. 171, "The Relations of Kames and Eskers" by J. W. Gregory, *Geogr. Journ.,* Vol. 40, No. 2, 1912, pp. 169-175.

Spain. Estadística de Obras Publicas. 1° de Enero de 1912. 1:1,000,000. 44° - 35⅔° N.; 9⅔° W. - 4¾° E. 3 colors. With inset: Islas Canarias. [1:1,000,000]. 29½° - 27½° N.; 18¼° - 13⅓° W. 2 colors. Dirección General de Obras Publicas, Madrid (1912).

[Large-scale map showing all wagon roads (divided into five classes), railroads (both standard and narrow gage), mine railways, tramways, canals, reservoirs and lighthouses (with their range) in Spain.]

WORLD AND LARGER PARTS

Northern Hemisphere. [Isogonenkarte der Nordhemisphäre für die Epoche 1500]. [Mercator projection; equatorial scale 1:140,000,000]. 70° N. - 0°; 110° W. - 120° E. Accompanies on p. 20 "Die erdmagnetische Deklination um das Jahr 1500" by H. Fritsche, *Pet. Mitt.,* Vol. 58, II, July, 1912, pp. 20-21.

[Cf. similar map by Nansen listed under "Oceanographical" in *Bull.,* Vol. 44, No. 3, 1912, p. 240.]

Northwestern Europe and Greenland. Das skandische Senkungsgebiet mit Randhebungszentren. Entworfen von Prof. Dr. Gerard De Geer. 1:8,000,000. 86° - 54° N.; 75° W. - 75° E. 8 colors. Taf. 16, "Kontinentale Niveauveränderungen im Norden Europas" by G. De Geer, *Pet. Mitt.*, Vol. 58, II, Sept., 1912, pp. 121-125.

[Illuminating map illustrating the relation of the depressed area of the "Scandinavian Sea" to the surrounding regions of uplift. By "Scandinavian Sea," for which the shorter term "The Scandic" is also suggested, is meant the basin enclosed between Greenland and Scandinavia on the N. W. and S. E. and between the Northeast Foreland-Spitzbergen ridge together with the western edge of the shelf of the Barents Sea, on the N. E., and the Iceland-Faroe ridge together with the northern edge of the shelf of the North Sea, on the S. W.

Isobaths are shown with an interval of 500 meters. For Fenno-Scandia "eo-hypsals" (i. e., the generalized contours of the Tertiary surface) having the same interval and isobasals (lines of equal uplift) are given. There are additional symbols showing Quaternary and Tertiary eruptives, centers of uplift, fiord topography and faults.]

Pacific Ocean. Die Massnahmen der Rand-Grossstaaten des Grossen Ozeans zu seiner Beherrschung. [Mercator projection: equatorial scale 1:100,000,000] 80° N. - 60° S.; 105° E. - 60° W. 4 colors. With inset: Die Insel Palmyra als nord-amerikanische Kohlenstation. 1:75,000. [5°52′ N. and 160°5′ W.]. 2 colors. Taf. 15, "Die Insel Palmyra und der Panamakanal" by H. Wichmann, *Pet. Mitt.*, Vol. 58, II, Aug., 1912, pp. 118-120.

[The main map shows the comparative distances between Panama and Manila via Honolulu, Palmyra Island and Pago Pago, and the relationship of present and possible future British, American and Japanese coaling stations in the Pacific, in consequence of the reported annexation of Palmyra Island for the United States by Rear Admiral Southerland.]

CARTOGRAPHICAL

Neue geomorphologische Kartendarstellung einer Ideallandschaft. Entworfen von Dr. Hans Gehne. 7 colors. Taf. 13, "Eine neue Methode geomorphologischer Kartendarstellung" by H. Gehne, *Pet. Mitt.*, Vol. 58, II, Aug., 1912, pp. 72-73.

[Illustrates a new method of physiographic mapping similar to that recently suggested by Passarge in his "Physiologische Morphologie" (*Mitt. geogr. Gesell. Hamburg*, Vol. 26, 1912, pp. 133-337). Hachures of different colors, based upon the usual contours, are used to represent specific geological horizons or strata physiographically a unit. Areal colors are used to denote erosional forms, identity of color indicating equality of age.]

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ERRATA

p. 68. line 9 from bottom, for “A Grèce (Guides-Johanne)” read “Grèce (Guides-Joanne)”

p. 79, line 2 from bottom, for “6°8′ - 5°4′ N.” read “5°52′ - 6°46′ S.”

p. 96, line 8 from bottom, for “Mont de a Gouille” read “Mont de la Gouille”

p. 97, line 2 from top, for “Wildstrubal” read “Wildstrubel”

p. 157, under “Morocco”, line 3, for “40°58′ W.” read “4°58′ W.” and, line 6, for “40°57′ W.” read “4°57′ W.”

p. 160, under “Australasian Mediterranean”, line 4, for “pp. 662–624” read “pp. 622–624”

p. 160, under “Indian and Pacific Oceans”, line 4, for “pp. 504–591” read “pp. 585–591”

p. 160, under “North Atlantic Ocean”, line 1, for “and” read “an”

p. 169, last line of title of map, for “1:217,600” read “1:792,000”

p. 202, line 11 from bottom, for “Privatedozent” read “Privatdozent”

p. 293, line 9 from bottom, for “additions” read “editions”

p. 294, line 7 from top, for “Manu group” read “Manua group”

p. 294, line 17 from top, for “he begin” read “he began”

p. 335, line 20 from top, for “Einzelförme” read “Einzelformen”

p. 365, lines 9 and 12 from top, for “Quarternary” read “Quaternary”

p. 458, line 2 from bottom, for “microscopic” read “macroscopic”

p. 553, second subdivision under Asia, for “Asiatic Russia” read “Asiatic Turkey”

p. 797, under “United States-Mexico”, line 4, for “1:50,700” read “1:500,000”

p. 876, under “Physical Geography”, second entry, for “Meckling, L.” read “Mecking, L.”

facing p. 896, map of the Urubamba Valley between Rosalina and Pongo de Mainique: on inset in upper left hand corner the course of the Urubamba River should have been continued to the north, beyond the confluence with the Timpia.